

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.

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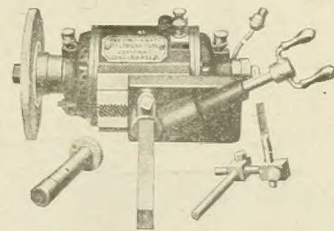
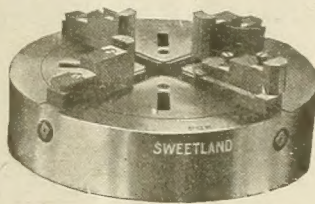
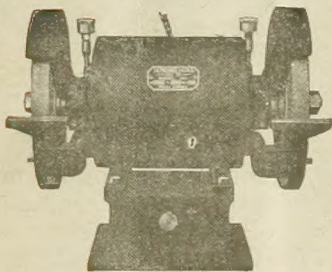
Publication Office: Toronto, March 13, 1919

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Machine Tools and Supplies

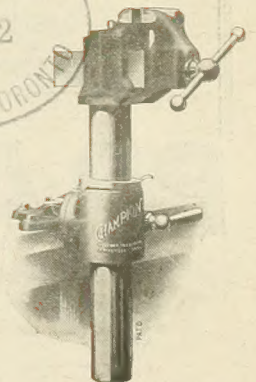
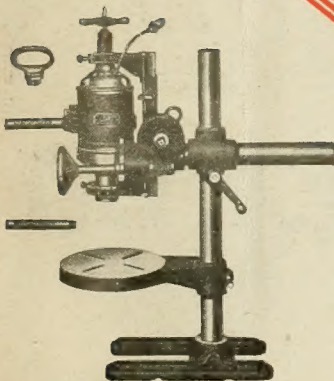
THE STANDARD of quality that characterizes our Machine Tools and Mill Supplies places us in a position whereby we can emphasize to prospective buyers their guaranteed reliability.

Conclusive proof of their fundamental merit and the assurance of service and satisfaction they carry is represented in increased trade.



**Geo. F. Foss Machinery and
Supply Co., Limited**

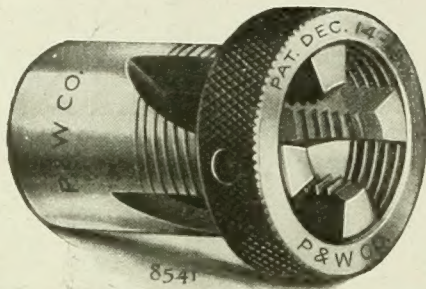
305 St. James Street
MONTREAL
QUE.



CANADIAN MACHINERY

SMALL TOOLS

Taper Thread Adjusting Collar



Spring Screw Die

Insures Uniform Concentric Adjustment

P. & W.

Spring Screw Dies
and **Hollow Mills**

Advantages of the
Taper Thread Adjusting Collar

Ease and delicacy of adjustment to FINE LIMITS are secured without trouble and loss of time.

All lands or prongs of the die or hollow mill are adjusted in or out exactly the same amount by merely turning the collar, thus giving rise to the term CONCENTRIC ADJUSTMENT.

This concentric adjustment results in each land or cutting edge doing its proper share of work, and as a perfect circle is always maintained, accurate results are assured.

By having the bearing always on the point, there is no tearing while backing off, and the correct amount of clearance is obtained.

Write for 4-page descriptive Circular giving size and dimensions.

Precision Machine Tools, Standards & Gauges

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

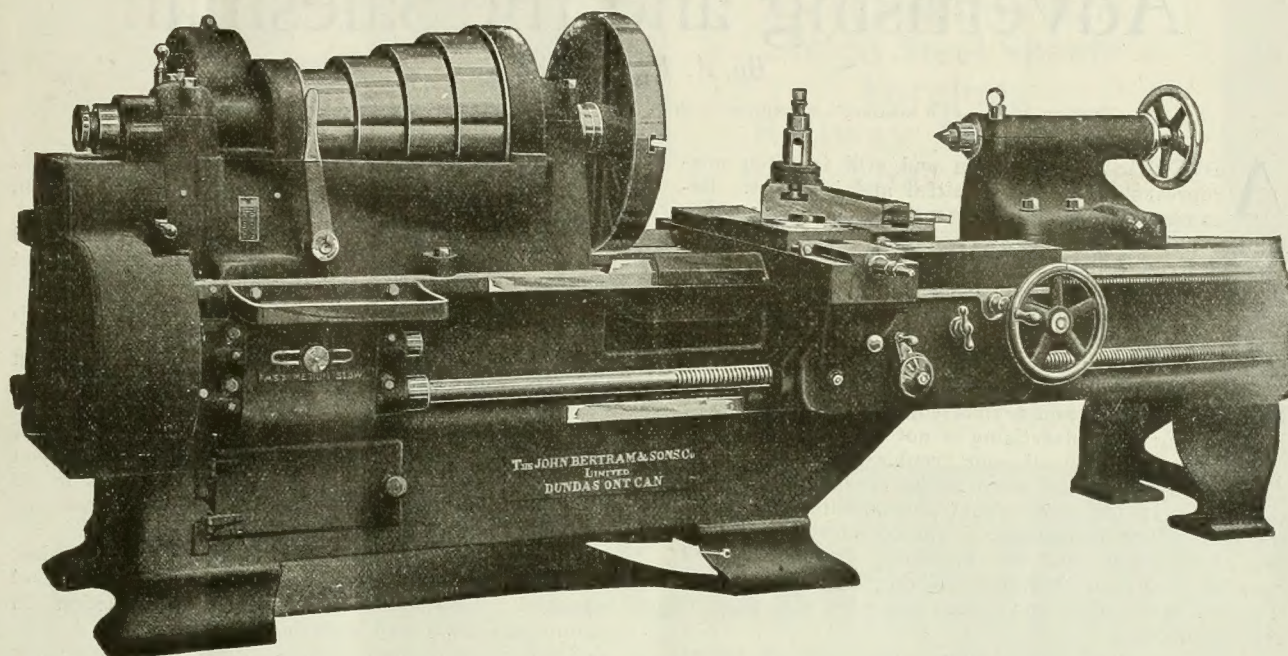
MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg

WINNIPEG
1205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.

BERTRAM MACHINE TOOLS



Double Back Geared Gap Lathe 26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

The John Bertram & Sons, Co., Limited

MISCELLANEOUS DEPARTMENT

DUNDAS, ONTARIO, CANADA



MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.
WINNIPEG
1205 McArthur Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.



The Publisher's Page

TORONTO MARCH 13, 1919

Advertising and the Salesman

By A. R. Maujer

(From an address at a salesmen's convention of the Underfeed Stoker Company of America, Cleveland, 1918)

ADVERTISING has been and still is often misrepresented by the deceitful and ignorant. Because of this misrepresentation many seeming failures have transpired, and advertising has been condemned wrongfully. Because your company has just launched an epochal advertising campaign, I want to state the case for advertising fairly and squarely, so that you will know the aid it will give you, but at the same time you will not be drugged into the belief that all you now have to do is to sit around with your feet upon the desk and acknowledge the orders as they come rolling in. Advertising is not a patent medicine; it is not a cure for all your troubles.

If Walter Johnson were to be transferred to the Cleveland "Indians," he would undoubtedly strengthen the team. But his advent would be no sign that the rest of the team could quit hustling. They would still have to play their positions and they would still have to go up to the plate and whang out a hit with reasonable regularity.

Similarly, with this championship team of stoker salesmen, because advertising has been drafted to help you win it does not follow that your playing speed should be let down.

Now, how will advertising make your work in selling easier and more efficient? To explain this it is necessary to trace the history of a typical or average stoker sale.

To-day it is truly said, things are sold, they are seldom bought.

For your product to be purchased you must attract attention, arouse interest, create desire and secure action.

You can attract attention by a series of personal calls. If the prospect is in and he isn't too busy to see you, you may arouse interest. If he is the proper man to see and if the plant isn't already equipped with satisfactory stokers or if, in the case of a new plant, the stoker question hasn't already been settled, you may create desire and secure action.

However, the starting point of all is the attracting of attention. Unless you get that you get nothing at all. If they don't know about you they certainly are not likely to give you a chance to figure.

Now, attention can be secured by the delivery of a catalog, the opportune arrival of a circular or letter, or by a printed advertisement about as well as by a personal call.

For the purpose of merely attracting attention any of the methods just mentioned will do. But, from the standpoint of cost, the advertisement ranks first. Assume that the average range per day for a salesman is six calls and the salesman's cost is—well, each of you can figure out what it costs you to make six

calls—say it's five dollars a call. Mind you, this would be only to secure attention. Having secured attention, interest, desire and action would still have to be aroused. Thus, if we assume 1,000 actual plants in Cleveland and, say, 500 available ones, we would have a cost of \$2,500 for canvassing Cleveland just once.

Sending a catalog or circular would be cheaper, but still unnecessarily high-priced for merely attracting attention. The catalog could not cost less than 25 cents, delivered, and the circular letter would be at least five cents. An effective advertisement costs about 1.25 cents. In other words, for the cost of canvassing Cleveland just once by personal call you can canvass 25,000 actual and potential buyers in all parts of the country for eight to sixteen weeks at weekly or bi-weekly intervals.

Larger-scale production and turn-over mean low cost. Witness the Ford car and Woolworth's nickel bargains. Advertising is large-scale production in gaining attention and arousing interest.

Then, if it is used instead of the more expensive alternative methods, the general efficiency of the selling organization is increased.

Advertising of itself cannot sell stokers any more than artillery of itself can win battles. What is required is a winning combination of advertising to form the barrage; the catalog, circular, follow-up letter and house organ to serve as the machine-gun equipment and the personal sales force to act as the infantry to go over the top at the critical time and actually take the stronghold of the buyer by storm.

The earlier months of the Great War were studded with advances costly in human life because shells were scarce and the artillery preparations were, of necessity, brief and insufficient. On the other hand, low-casualty advances were achieved in the closing months because barrages were sustained and effective.

Just as a deficiency of adequate artillery preparation means high cost in casualties, so does a deficiency in advertising preparation mean high cost in sales opportunities and orders actually fought for, lost.

Sales campaigns conducted without adequate advertising preparation must ever prove costly because much of the work is done before the catalog or the salesman ever gets to the prospect; just as much of the work of a low-casualty battle is done before the troops ever start to go over.

When we examine the history of a typical stoker sale we can see the reason. Such an important piece of equipment as a stoker, involving a rather large investment, is seldom bought on snap judgment. The purchase is usually the result of considerable thought and investigation.

Continued on Page 59.

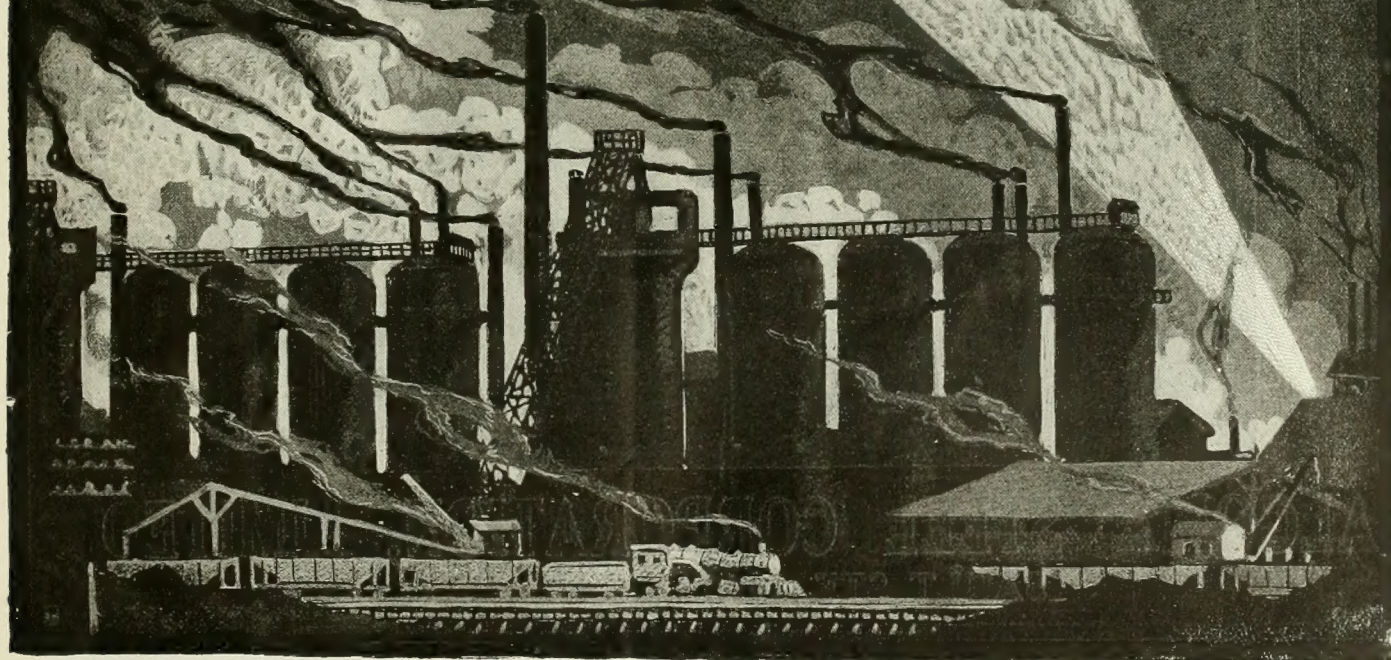
Quality

Service

PRODUCTS

By-Product Foundry Coke
"Hamilton" Pig Iron
Open Hearth Steel Billets
Steel and Iron Bars
Stelco Steel Sheets
Forgings
Railway Fastenings
Pole Line Hardware
Bolts, Nuts and Washers
Wrought Pipe
Screws, Wire
and
Wire Products
of every description

THE STEEL COMPANY OF CANADA LIMITED HAMILTON MONTREAL



STEEL RAILS

Open Hearth Quality
(All Sections from 12 lbs
to 100 lbs per yard)

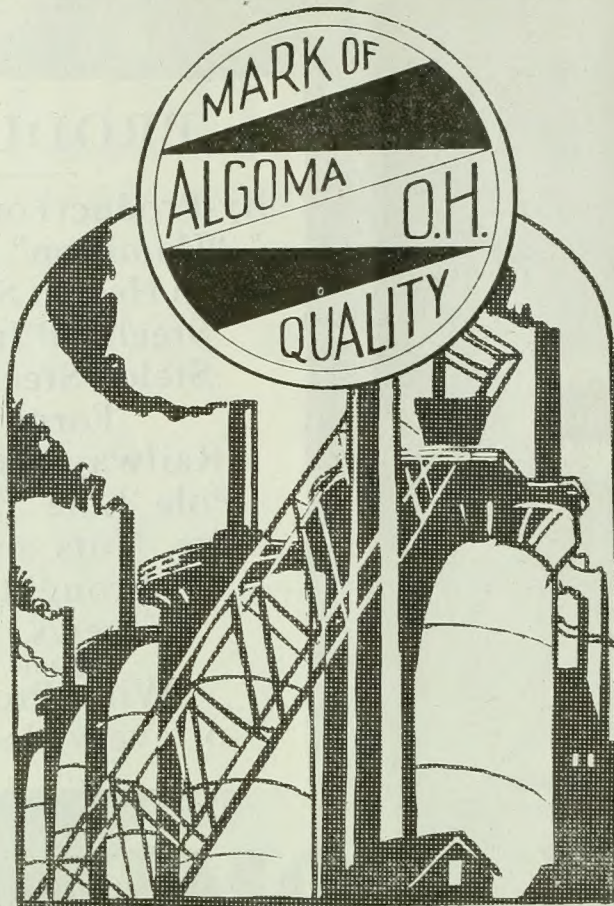
SPLICE BARS

STEEL TIE PLATES

PIG IRON

BASIC, FOUNDRY-
BESSEMER

SULPHATE OF AMMONIA



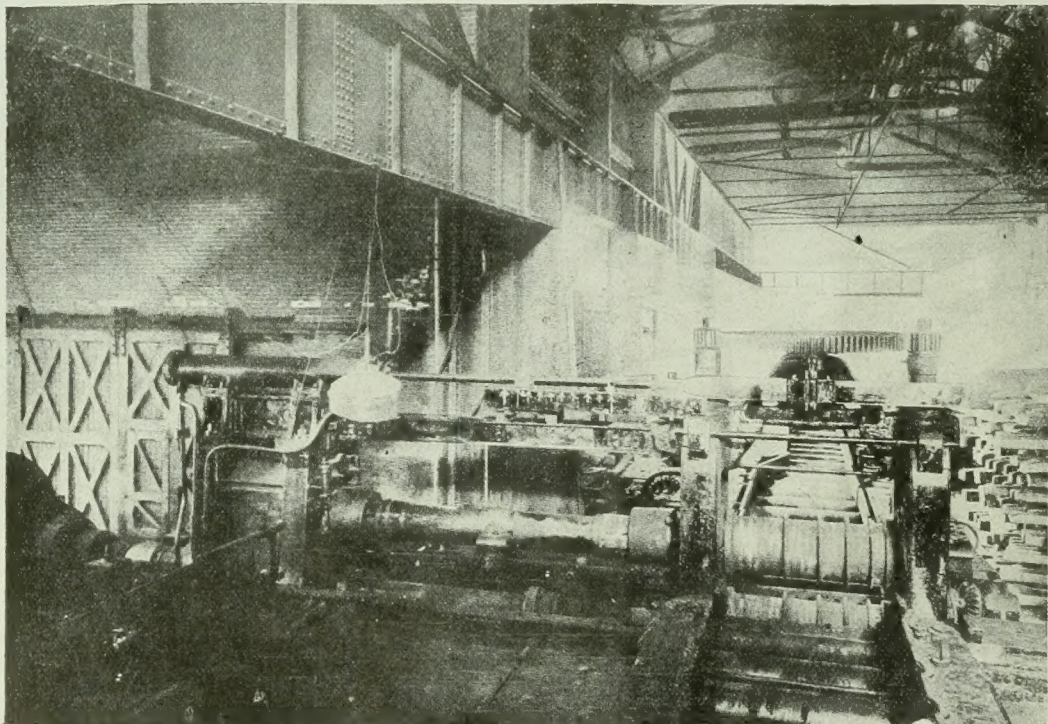
BLOOMS, BILLETS, SLABS, STRUCTURAL STEEL MERCHANT BARS

CONCRETE REINFORCING BARS

IRON, BRASS AND BRONZE CASTINGS

Sulphuric Acid.

Nitre Cake.



ALGOMA STEEL CORPORATION, LIMITED
SAULT STE. MARIE, ONTARIO

BETTS

Betts Heavy Duty Machine Tools Have Stood the Test of Time

For more than fifty-seven years the name "Betts" has been identified with the building of heavy duty machine tools.

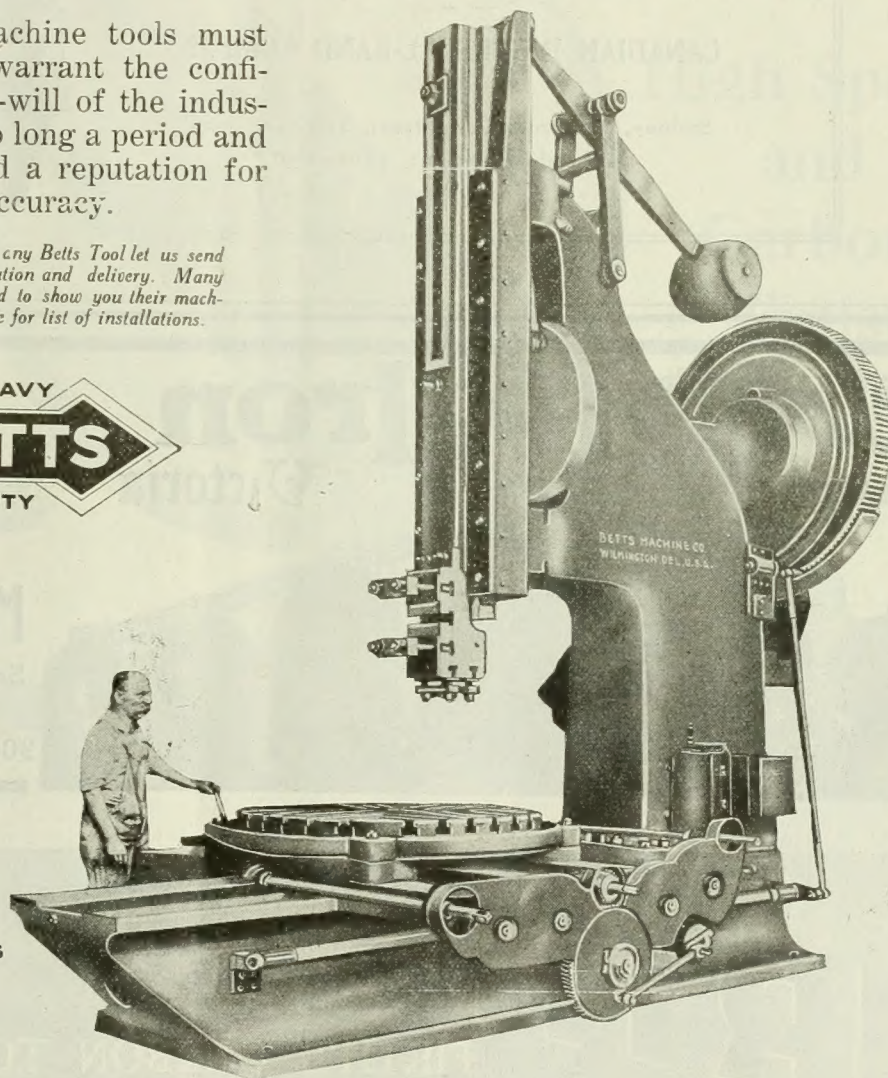
A line of machine tools must have merit to warrant the confidence and good-will of the industrial world for so long a period and to have acquired a reputation for reliability and accuracy.

If you are interested in any Betts Tool let us send you specifications, quotation and delivery. Many Betts owners will be glad to show you their machines in operation. Write for list of installations.

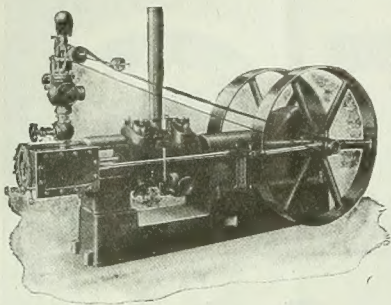
The present Betts organization is upholding the traditions of development and service established by the Betts Machine Co. in 1861.



Planers
Boring and Turning
Mills
Horizontal Boring
Drilling and Milling
Machines
Tire Turning Mills
Car Wheel Borers
Crank Slotters
Coach Wheel Lathes
Driving Wheel Lathes



BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON, DEL.



Economy in Upkeep

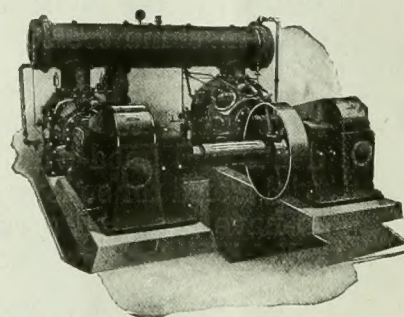
C-I-R-Co Air Compressors are all tested before leaving the Shop ; all sizes are designed for economical running. Flood lubrication is not only cleanly and thorough but low in cost. Modern valve design gives greater output per H.P., input ; the efficient intercooler still further lowers the power cost.



IT PAYS TO BUY A MODERN COMPRESSOR

**CANADIAN INGERSOLL-RAND COMPANY
LIMITED**

Sydney, Sherbrooke, Montreal, Toronto, Cobalt
Winnipeg, Nelson, Vancouver



**Coal
Coke
Iron Ore**

Pig Iron
Victoria

FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office :
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut ^{HIGH}SPEED Steel
The Ideal Steel for Machining Shells
FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager

LOOK FOR **THIS** NAME **WILT**

High Speed
and
Carbon
Twist
Drills

*"Where there's
a WILT---
There's the
Way"*



The WILT line of High Speed and Carbon Twist Drills is a line you can depend upon for satisfactory results.

With highest quality material and workmanship, they are built on the right principle and made right—built to stand up to the job.

There is no danger of using WILT Drills and wishing you had used others. Once used you will always look for that name—WILT.

WILT TWIST DRILL CO.
OF CANADA, LIMITED

WALKERVILLE

ONTARIO

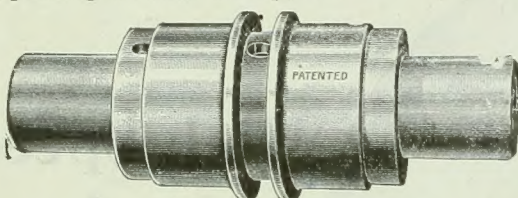
London Office : Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E. C. 2, England.

THE JOHNSON FRICTION CLUTCH

In the "Snyder" and a Host of Other Drill Presses

We feel justified in saying that Johnson Friction Clutches are in use wherever efficient drilling machines are manufactured.

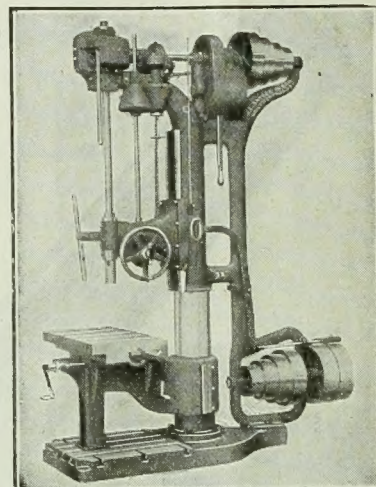
Every day sees new names added to our long list of machines which have Johnson Friction Clutches in their design. This wouldn't be so if there wasn't something a little better than ordinary about Johnson Friction Clutches. A simple request for information about your own proposition will bring surprising details and prices.



Double Clutch—Exterior.

Write us for our
Yellow Data
Sheets

HERE



Courtesy of J. E. Snyder & Son, Worcester, Mass.

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal; The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. 1, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdqrs. Chambers, 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.

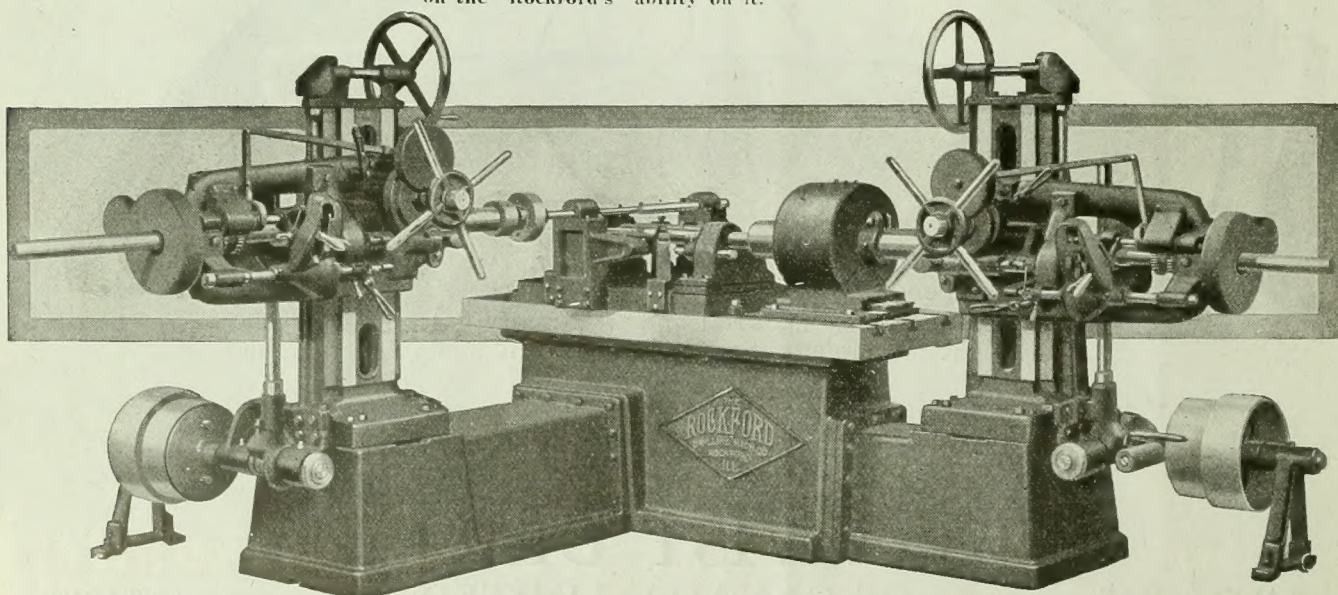
THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Rockford Horizontal Boring Machine

For
Automobile
Manufacture

This tool is unusually rapid and accurate in the boring of crank cases, transmission cases and rear axles. Has two heads at right angles to each other. Spindles bore longitudinal and cross holes in work simultaneously.

Send us blue prints of your boring work and we will give you figures on the "Rockford's" ability on it.



The Rockford Drilling Machine Co., Rockford, Ill.

LOCOMOTIVE CASTINGS

CANADIAN STEEL FOUNDRIES, LIMITED
Transportation Building
MONTREAL



Electrite

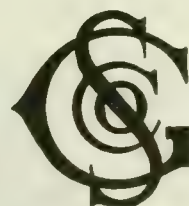
Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE
ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

uranium



Forging Billets and Bars
Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

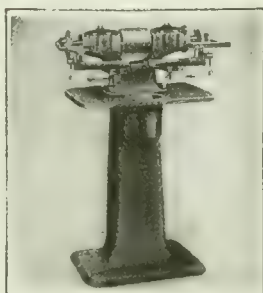
High Speed Steel

General Steel Company

Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

FORD-SMITH Grinders

*A fine example
of high grade
material and
workmanship*



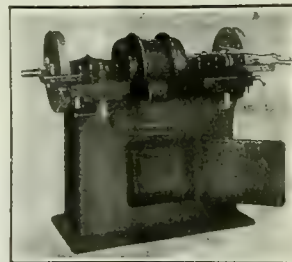
General Purpose Grinder.



Water Tool Grinder

FOREIGN AGENTS:

W. E. Storey, 3 Arundel St., London, Eng. Alf. Herbert,
Limited, 54 Dey St., New York, U.S.A.



Motor Driven Floor Grinder.

Motor-Driven Grinders
Floor Grinders
Bench Grinders
Water Tool Grinders
Swing Grinders
Disc Grinders
Special Grinding
Machinery
Hack Saws
Swivel Tables

Write for Catalogue
and price list.

**The Ford-Smith
Machine Co., Ltd.**

HAMILTON - ONTARIO

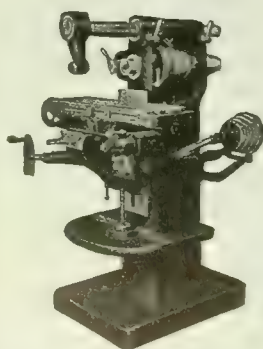
IMPERIAL GENUINE BABBITT METAL *The Highest Grade Manufactured*



Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

Manufactured and guaranteed to give excellent service by

**THE CANADA METAL COMPANY, Limited, FRASER AVENUE TORONTO, Hamilton, Montreal
Winnipeg, Vancouver**

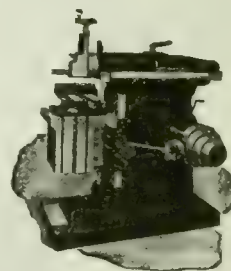


74 years of experience in the manufacture of high-grade Machine Tools, with thousands of our machines in shops giving daily satisfaction, are a recommendation for our product that should not be overlooked when buying new equipment.

We would appreciate your inquiry.

John Steptoe Co., Cumminsville, Cincinnati, Ohio, U.S.A.

Canadian Representatives: Garlock-Walker Machinery Co., Toronto, Ont.





"Not Steel but 'ts Master"

The Progressive Mfg. Co., Ltd.
Canada.

Gentlemen:-

We beg to advise that in spite of the rise in price of imported High Speed Milling Cutters, you can still secure a Canadian product at pre-war prices.

During the war, although our capacity was taxed to the limit in supplying STELLITE to Great Britain and France, as well as helping to keep Canada in the forefront as a producer of Munitions, we did not raise our prices, notwithstanding the fact that our costs increased enormously and are still up.

Let us help you to economize and at the same time secure maximum results.

Consult our Engineering Department.

We are, Sirs,

Yours respectfully,

DELORO SMELTING & REFINING CO., LTD.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West

THERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

"Red Cut Superior"

The Nationally Known—First Quality

HIGH SPEED STEEL

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

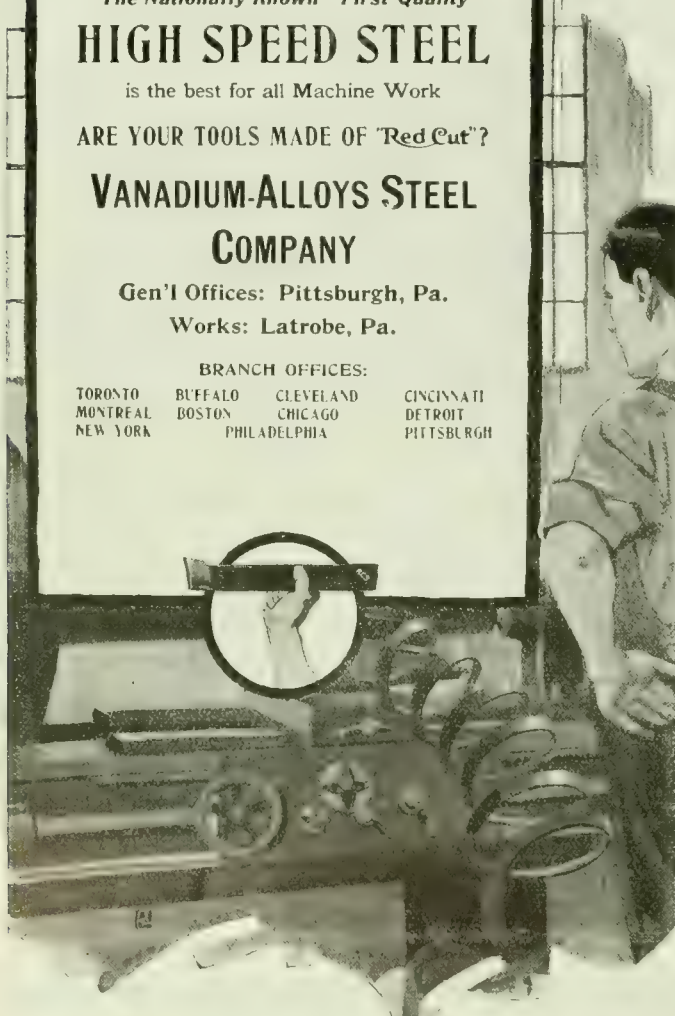
VANADIUM-ALLOYS STEEL COMPANY

Gen'l Offices: Pittsburgh, Pa.

Works: Latrobe, Pa.

BRANCH OFFICES:

TORONTO	BUFFALO	CLEVELAND	CINCINNATI
MONTREAL	BOSTON	CHICAGO	DETROIT
NEW YORK	PHILADELPHIA	PITTSBURGH	



Swedish Steel & Importing Co., Limited

Montreal New York Toronto Denver

Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK

SS

PROMPT SHIPMENTS from large stock

DOUBLE SS

WOLFRAM

MADE IN THE U.S.A.

HIGH SPEED STEEL

TRADE MARK

A Keen Cutter

WOLFRAM

Is Both

Strong in the Neck

VULCAN CRUCIBLE STEEL CO. ESTABLISHED 1900

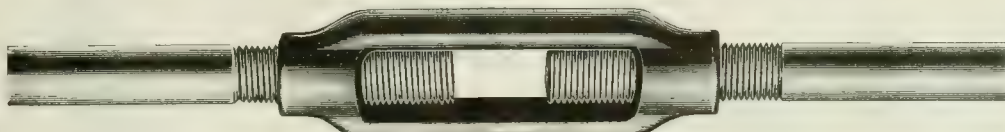
Aliquippa Pa. U.S.A.

Represented in Canada by Messrs Norton Callard & Company

MONTREAL QUE.

CANADA FOUNDRIES & FORGINGS LIMITED

DROP FORGED STEEL



TURNBUCKLES

16 Sizes, with or without Stubs
Large Stock---Quick Action

Produced at

Canadian Billing & Spencer Plant
Welland

LOCOMOTIVE AND CAR WHEEL TYRES

HIGH-SPEED AND CARBON TOOL STEEL

MISCELLANEOUS SHOP TOOLS

MADE IN CANADA

ARMSTRONG WHITWORTH OF CANADA, LIMITED

Head Office:

298-300 St. James Street,
Montreal.

Works:

Longueuil, Que.

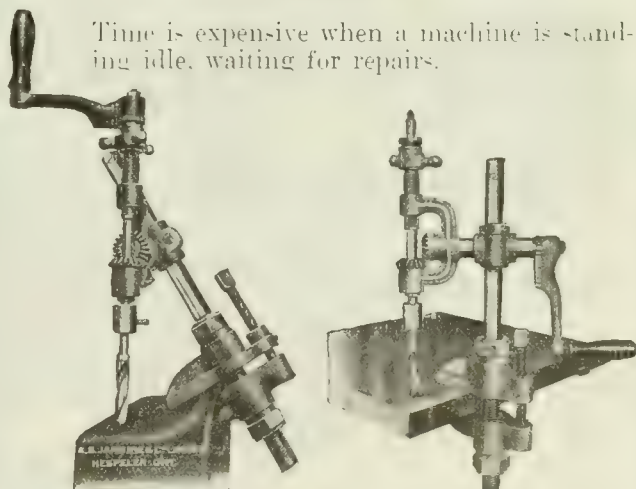
Branches:

126 Wellington St. E.
TORONTO

27 King William St.
HAMILTON

McArthur Building
WINNIPEG

Jardine Universal Ratchet Drill



Time is expensive when a machine is standing idle, waiting for repairs.

On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, \$26.50 net

Sold by all Machinery and Supply
Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

"WACO"

TRADE MARK



TRADE MARK



High Speed Steel

"Double Waco" Quality—for
Quick Production Work

"Turtle Brand"—High-class
Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS

Established 1870

SHEFFIELD, ENGLAND

*Sole Representatives
for Canada*

GEO. A. MARSHALL & CO.

1118 Queen Street West, Toronto, Ontario

*Phone Park.
250*



ELECTRIC Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings
for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND

ONTARIO

Peerless ^{HIGH}_{SPEED}

THE NEW STANDARD

Increases Production—50 to 100%



REPEAT ORDERS—

Here we are talking about repeat orders again, but if you could see the way they come in you would pardon our dwelling on that subject.

The one striking feature about our repeat orders is that so many of them come from large concerns who had been reasonably satisfied with other standard makes before they put in their first PEERLESS High-Speed, and since then they have sent us order after order for more and more of our machines.

Surely there must be some good reason for this, which will be perfectly clear to you when you try out a Peerless for yourself.

Let us ship you one on thirty days' trial. If you don't keep it we pay freight both ways.

PEERLESS MACHINE CO.

1607 RACINE STREET

RACINE, WISCONSIN

Don't Handle It—CONVEY IT

Manufacturing is more than putting raw materials through machines. The handling and transferring of materials from one machine or department to another enters into production costs just as much as machine operations.

You invest in machinery that will enable you to shave costs even slightly. Why not invest in equipment which, in many cases cuts handling costs 50 to 75%.

Link-Belt Conveyors transport finished or raw

materials at the lowest possible cost at factory, mill or wharf—anywhere indoors or out. In many cases they are the pace makers for the operation of entire factory departments. There's a Link-Belt Conveyor for every purpose. Write us. Let us send you our Conveyor Book.

**CANADIAN
LINK-BELT COMPANY**

LIMITED

Wellington and Peter Sts.
TORONTO



LINK-BELT

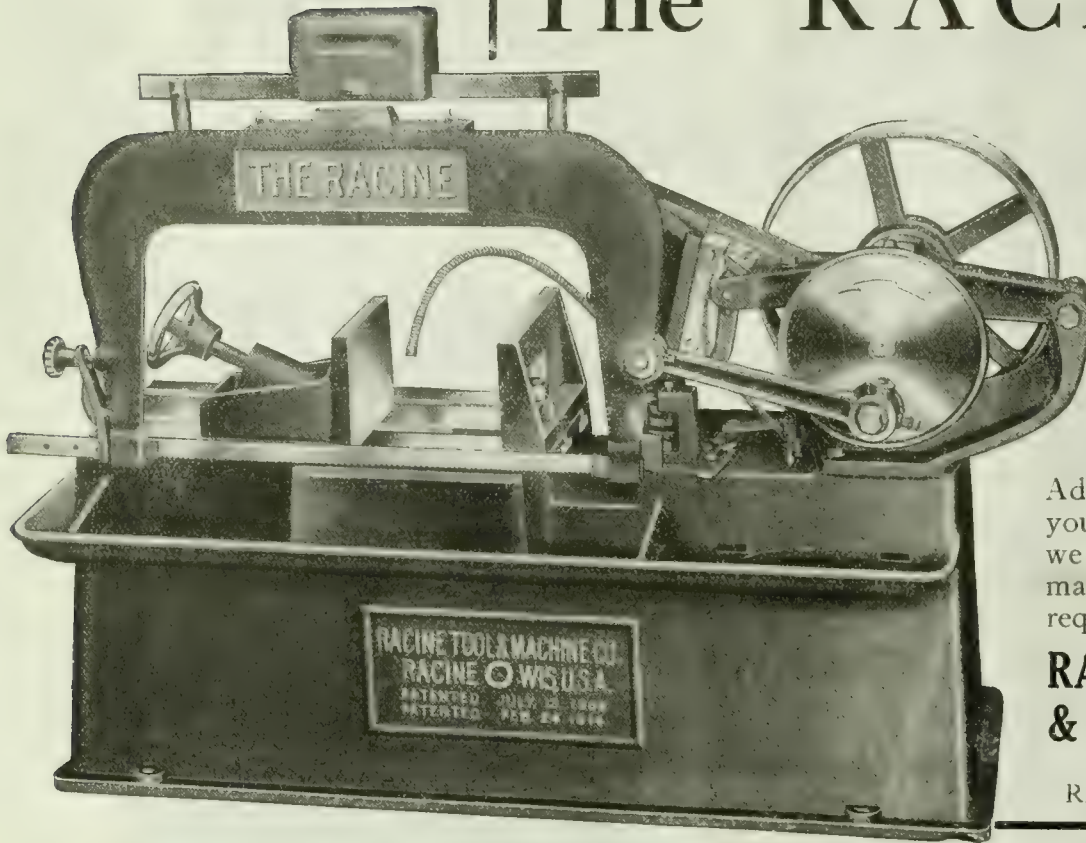
ELEVATORS AND CONVEYORS

We Also Make

- ☐ Elevators and Conveyors
- ☐ Link-Belt and Sprockets
- ☐ Silent Chain Drives
- ☐ Truck and Tractor Chains
- ☐ Electric Hoists
- ☐ Locomotive Cranes
- ☐ Wagon Loaders
- ☐ Coal and Ashes Systems
- ☐ Coal Tipple Equipment

Write for Catalogs
Place X in Square

The "RACINE"

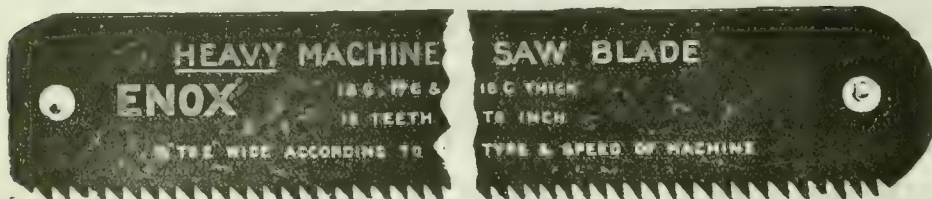


For Speed
For Accuracy
For Quantity
Production
For Saving in
Blade Costs
For Saving in
Material

Advise us the size stock
you intend cutting and
we will quote you on a
machine suited to your
requirements.

**RACINE TOOL
& MACHINE CO.**

Melbourne Avenue
RACINE, WIS., U.S.A.



ENOX
Hacksaw Blades

ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry
stocks and act as sole agents for the district.

Sole Makers:

FRY'S (LONDON) LIMITED

AN ENTIRELY BRITISH COMPANY

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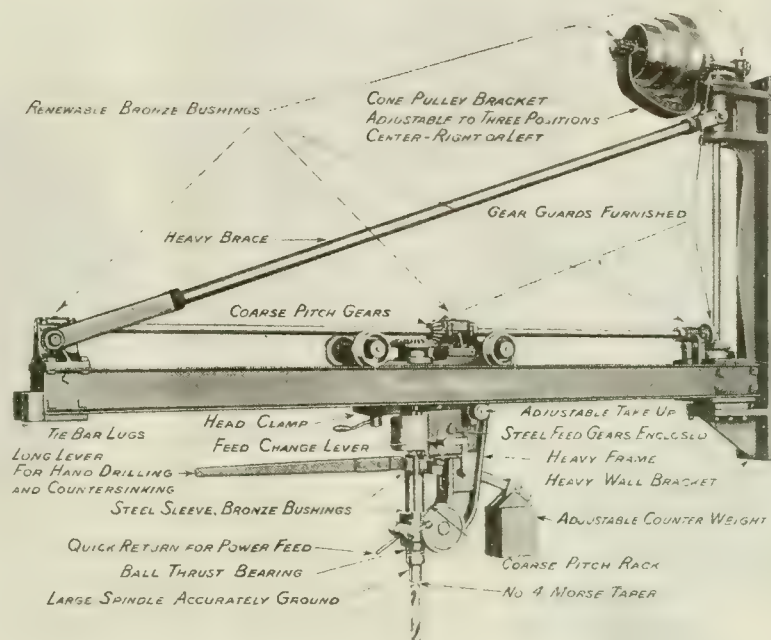
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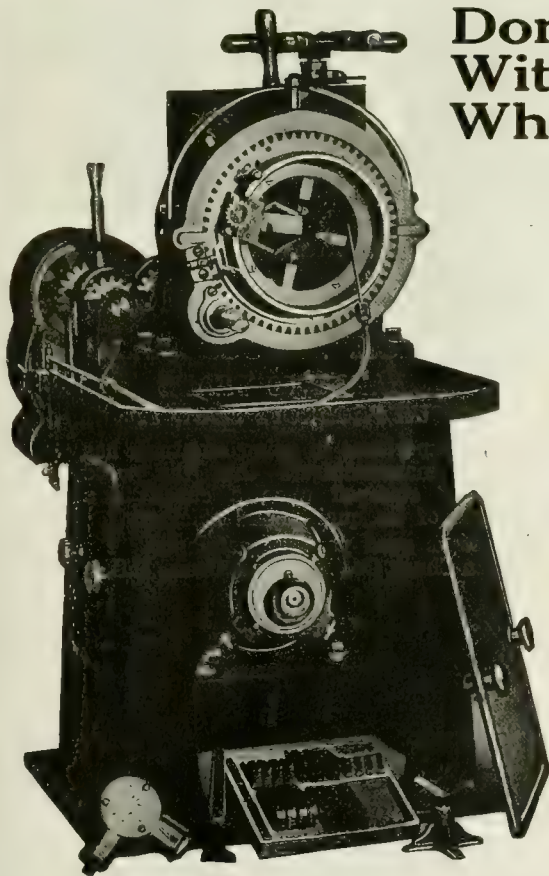
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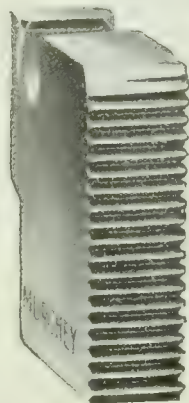
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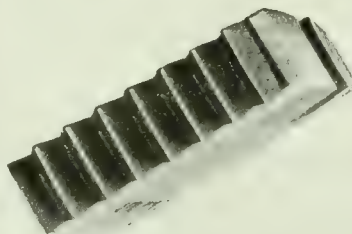
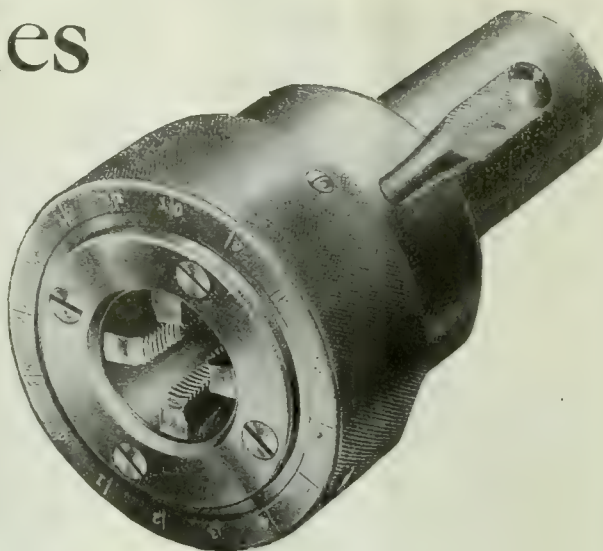
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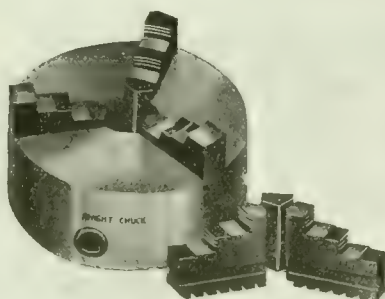
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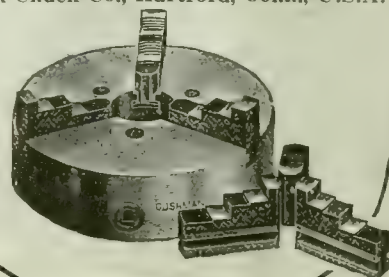
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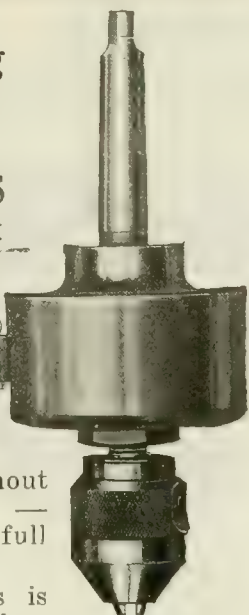
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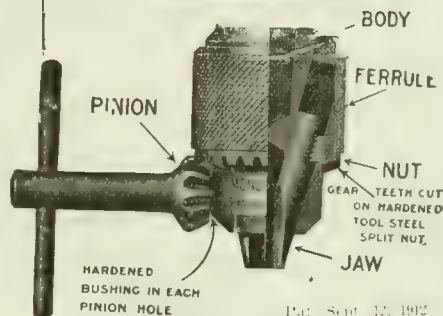


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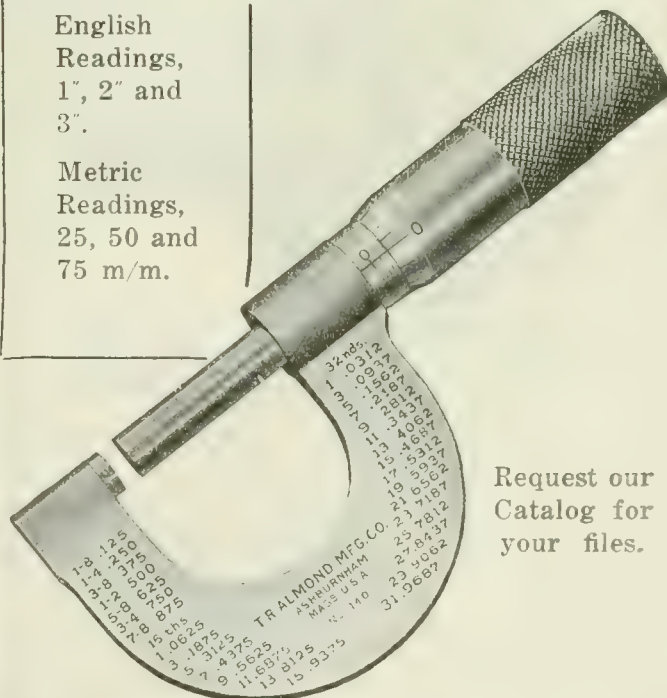
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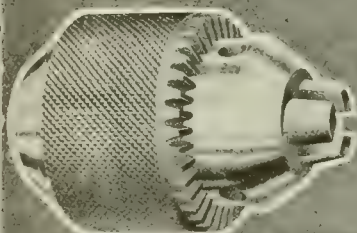
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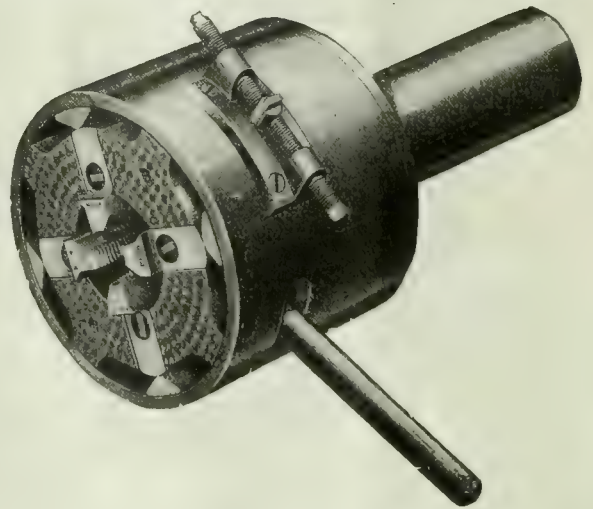
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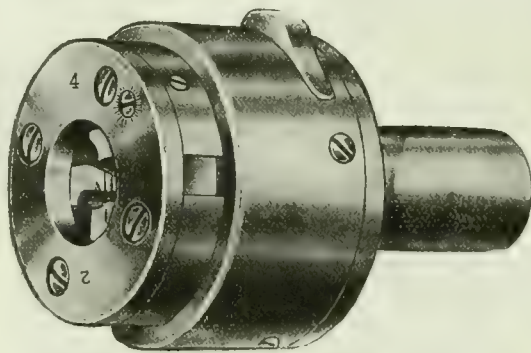


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are of small outside diameter compared with the size of work they do.

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All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

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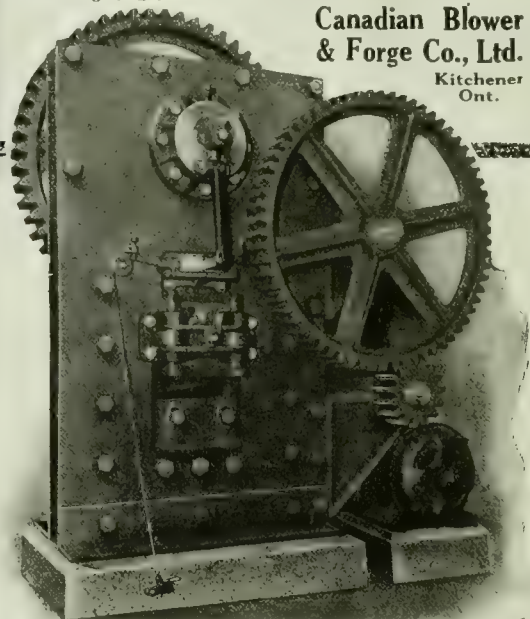
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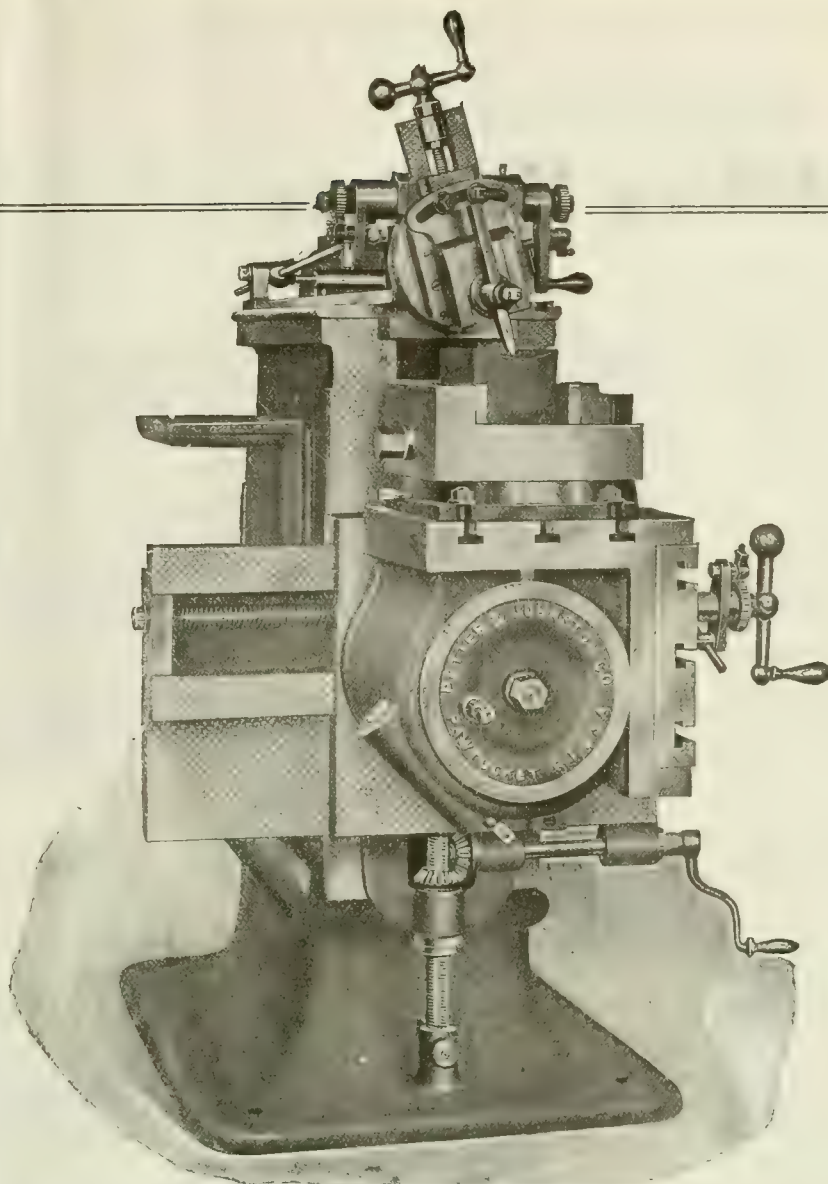
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Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

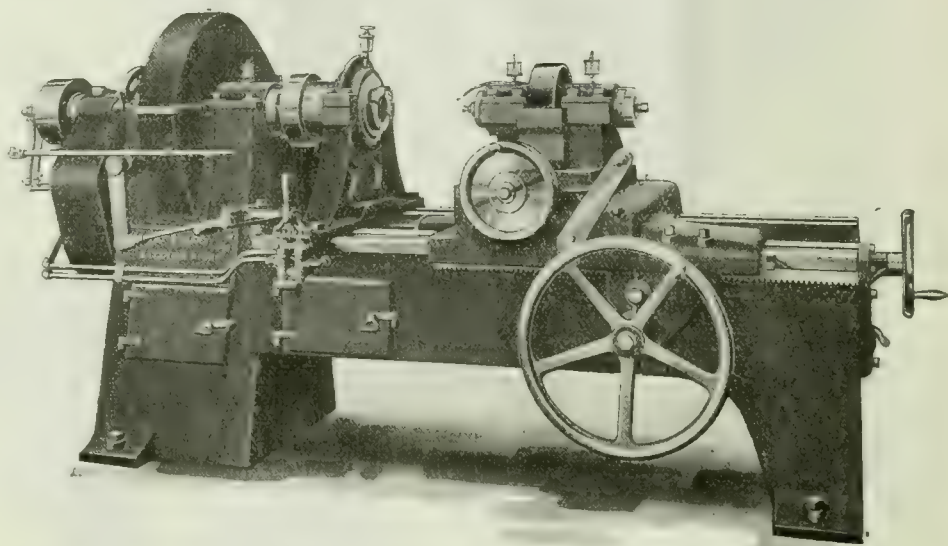
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Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

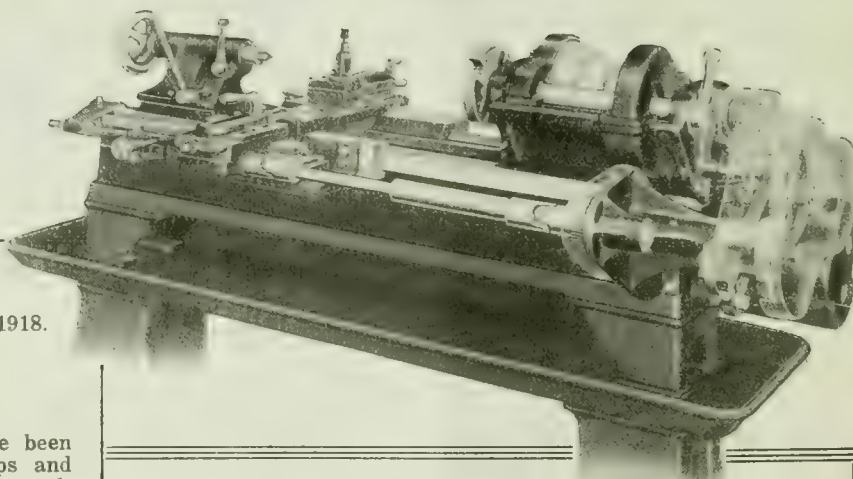
Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitches range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

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With best wishes, we are,
Yours truly,

B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"



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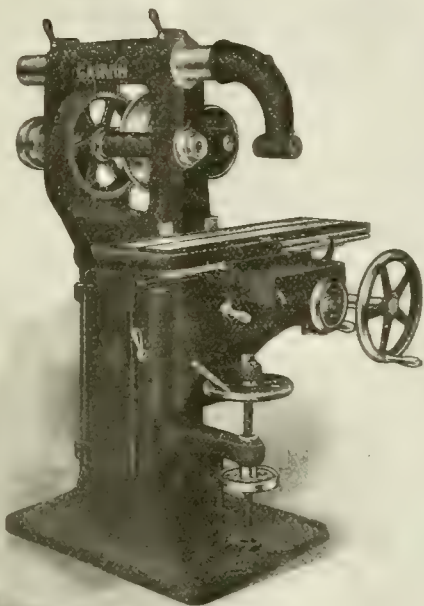
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No. 11 Plain Milling Machine
Use Code Abode

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Spindle Bearing Taper, with adjustment.
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Elevating Screw does not pass through the floor.

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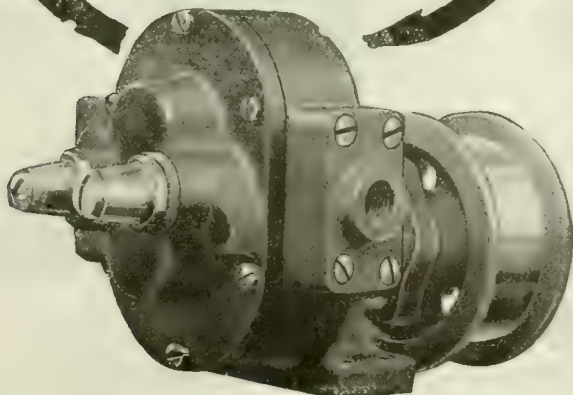
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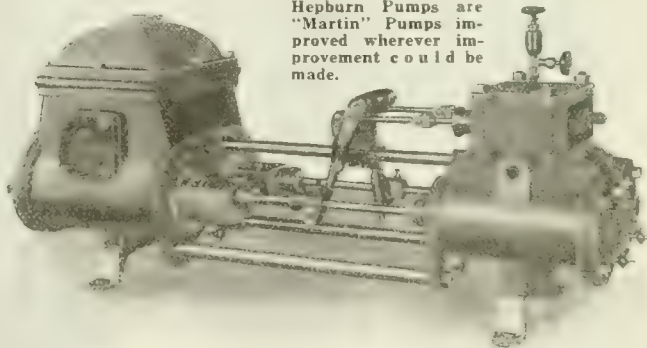
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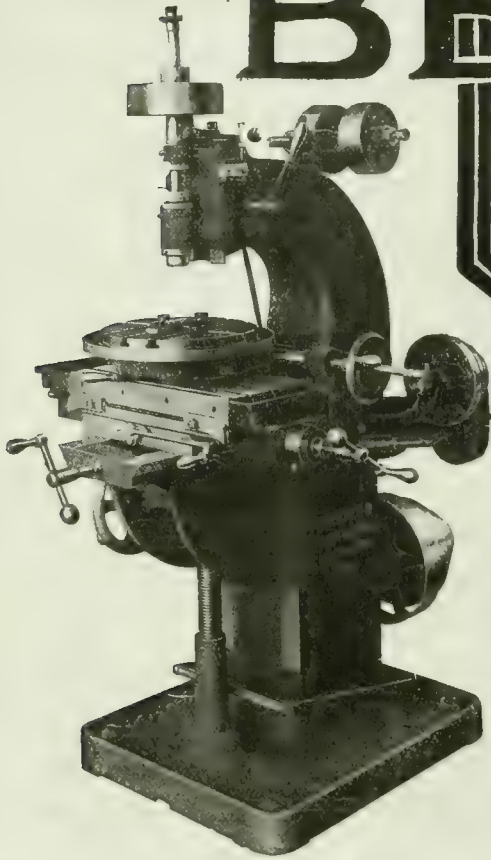
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and does it easily, with the minimum of time and labor. That is why superintendents, foremen and operators all like the LANDIS.

Many features of design make for this admirable ease of handling. The remarkable versatility of the machine is another powerful factor in its popularity. We believe this machine can perform more basic operations than any other type of machine tool.

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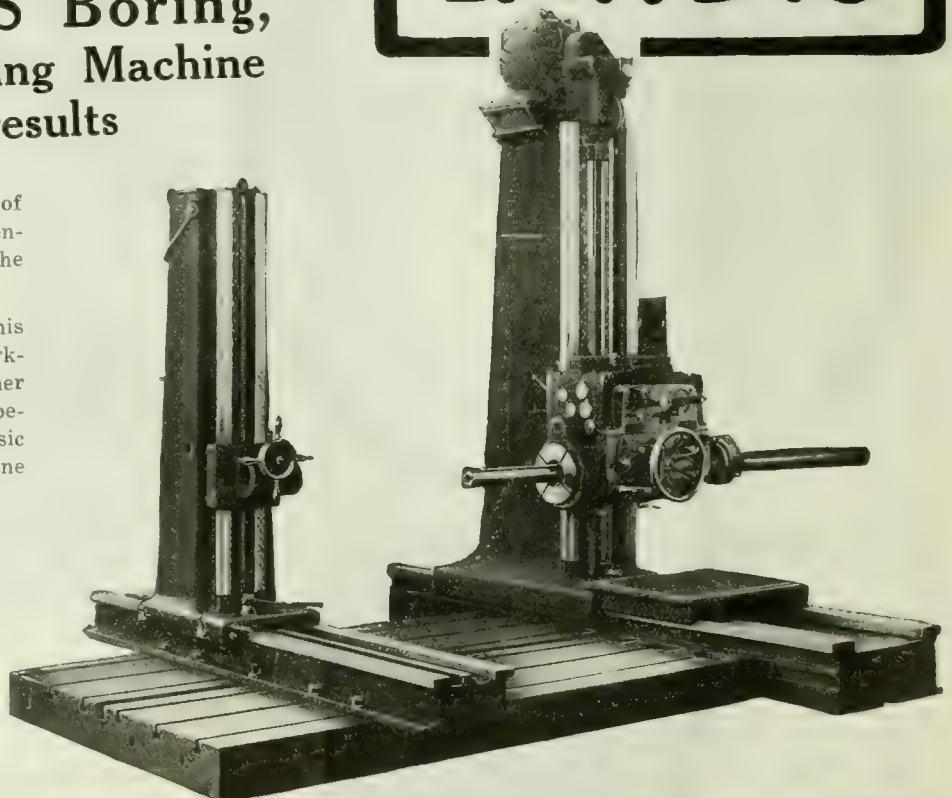
Landis Tool Company
Waynesboro, Pa.

New York Office, 50 Church St.

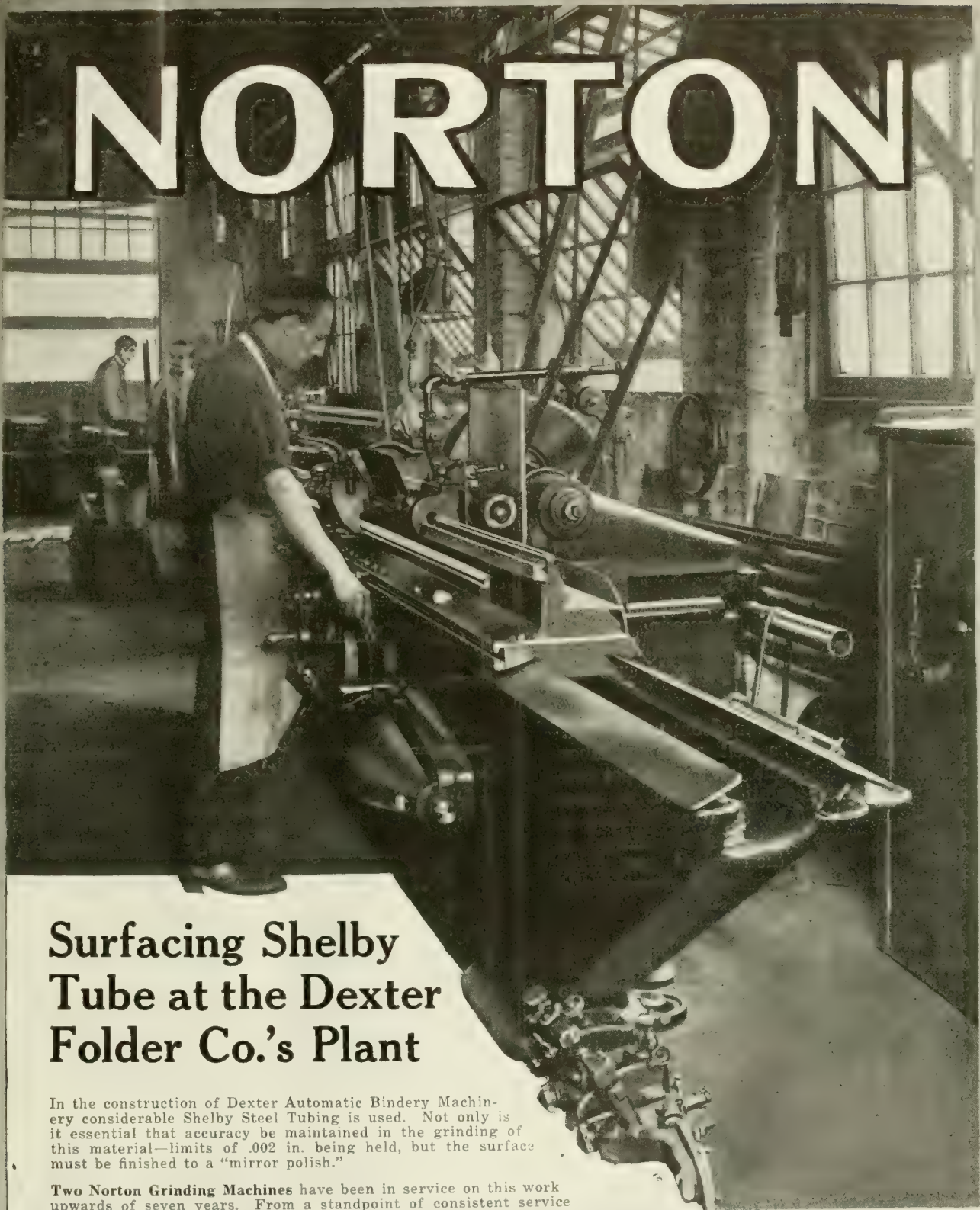
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Notes on Grinding

NORTON COMPANY,
WORCESTER, MASS.

No. 12A

Polishing

Some of the points brought out by recent successful trials with Aluminum grain in polishing may be of interest to the readers of this "Notes on Grinding" series. Glue, for example, represents many interesting problems in the modern polishing department.

Experience has taught that it is best to become familiar with each incoming shipment of glue. This is no reflection on the glue manufacturer, but conditions and mistakes in ordering entirely beyond his control may make two lots of glue quite different and it is always safest to examine each new shipment before using.

Many people are still guessing at the amount of water used to make a solution. A cold water soak, however, is the only sure way of determining this factor.

If the glue pot is cleaned out every evening, the reward will be well worth the labor. Dried or overheated glue left in the pot contaminates the fresh solution. Also, no more glue should be made up than can be used in one day. A glue that has been allowed to stand for 10 hours, then cooled over night and reheated in the morning is of practically no value.

Be sure and keep the glue pot covered. Evaporation tempts the operator to add fresh water during the day which is detrimental to the entire solution.

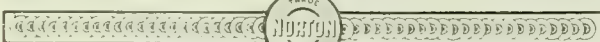
When setting up a polishing wheel, it is important that the abrasive be heated before the glued wheel is rolled in it, because if the abrasive is cold it has a chilling effect on the glue, reducing the sticking qualities. After the wheels have received the application of glue and abrasive, they should be dried for at least 10 hours before using.

NORTON COMPANY

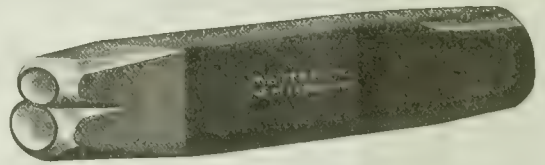
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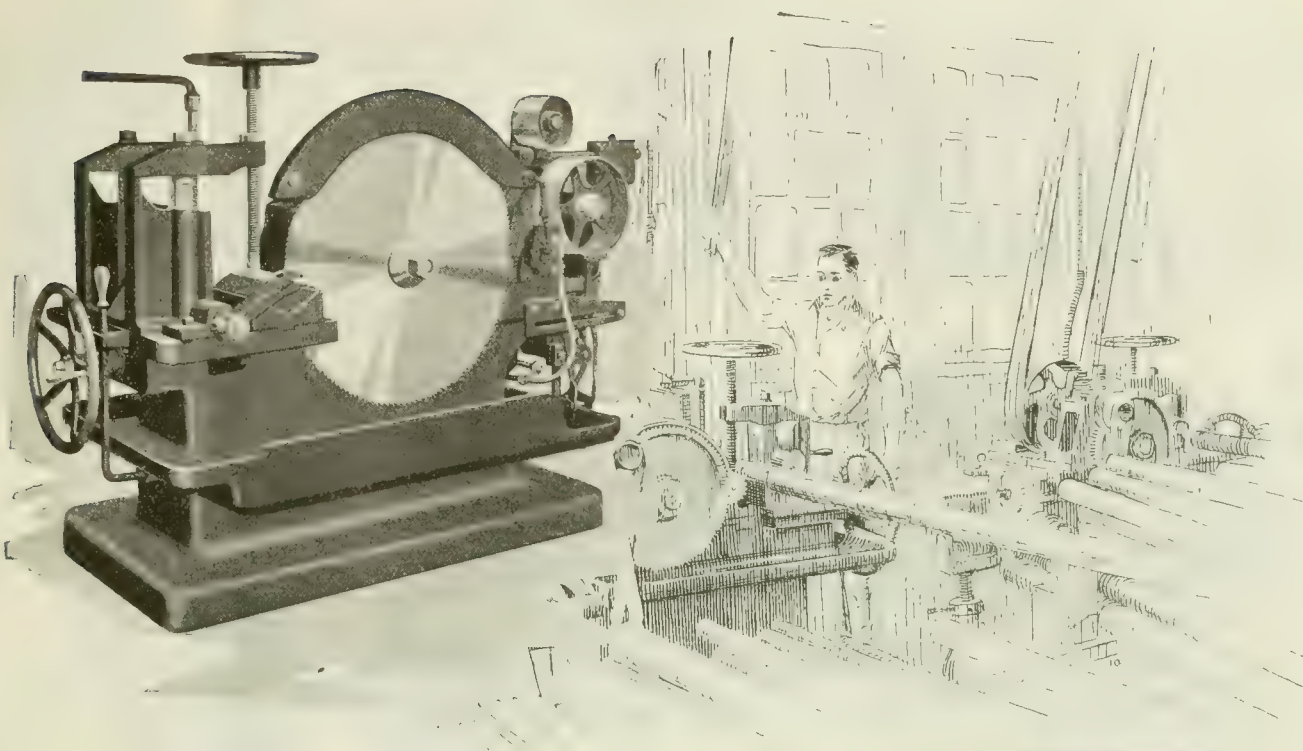
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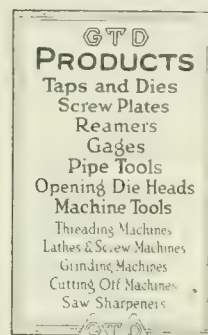
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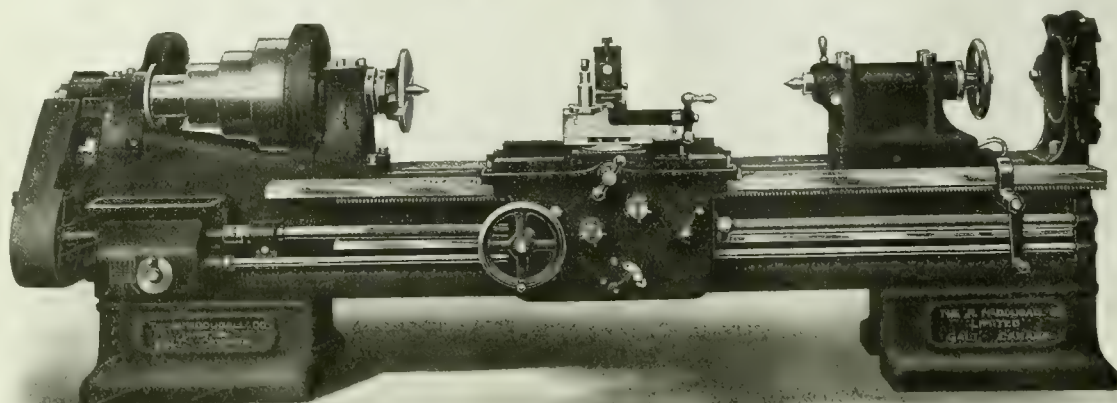
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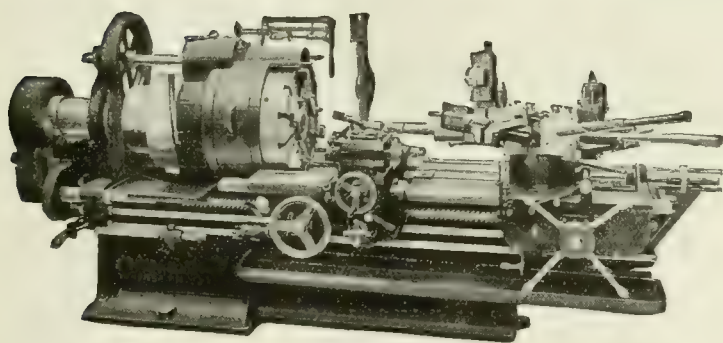
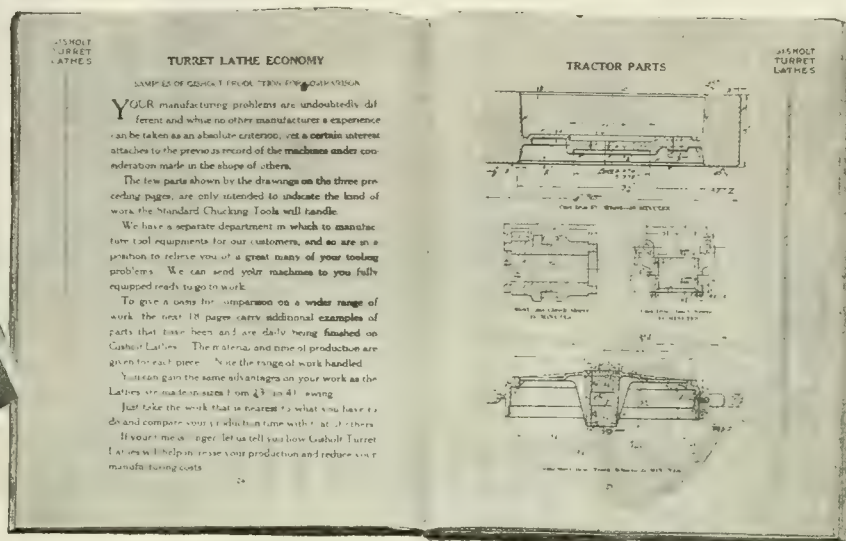
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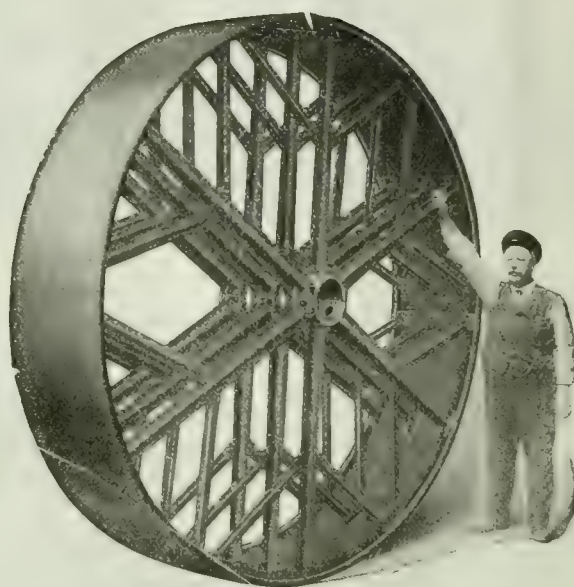
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CANADIAN MACHINERY

AND MANUFACTURING NEWS

Vol. XXI. No. 11.

March 13, 1919



The New Home of the Ford-Smith Co., Ltd.

Describing the New Plant at Hamilton, Canada, Which is Specially Equipped to Manufacture High-grade Machine Tools, With Millers as the Feature—Safety Lines and System of Power Interchange Are Worthy of Attention

By J. H. MOORE, Associate Editor Canadian Machinery

TO undertake the manufacture of such an established machine tool as millers, requires courage of no mean order, but on top of this to establish a miller business in four years that is recognized as a proven line is a distinct achievement.

Yet that is exactly what the Ford-Smith Machine Company, Limited, of Hamilton, Canada, have accomplished. Not only have they become known as manufacturers of first-class millers, but their increase in business has been so great, that to meet with the new conditions it was necessary that they move into larger quarters.

The Result

It was at this point that P. Ford-Smith, the president of the concern, decided on an entirely new plant, built with the idea of making it an up-to-date shop in every particular, specially arranged and equipped to manufacture milling machines in a broader sense than ever before.

The outcome of the new move was the building of the spacious plant as shown in the accompanying photographs, and a general description of the building itself follows in order to give readers an

idea of its general proportion and equipment.

General Data on Size of Plant

The building measures 352 feet by 60 feet, and is of one storey construction, yet so arranged that at any time an additional storey can be easily added. One feature especially that strikes the visitor on entering this plant is the splendid supply of light, for the place is practically a mass of windows, yet no glare is noticeable as the windows are made from mottled material which diffuses the light so that inside the plant it is practically as bright as outside in the open air. While speaking of the light problem, it might be well to mention that individual drop lights are strung for work after dark, each light having a late design of shade which spreads the light in such a manner as to overcome as far as possible the shade problem. In addition to these individual lights, there are placed at regular intervals larger and stronger lights, up nearer to the ceiling. At night the plant presents a very bright appearance, aiding the workmen to carry out their work without undue eye strain. There are also large lights placed down the centre aisle, in fact one

cannot help but see that the lighting problem, both by day and night, has been fully gone into.

The Main Office

No expense has been spared in the equipping of this end of the plant. Every up-to-date office necessity has been installed, including dictaphone, adding machine, etc. A special filing system to handle all cuts used for advertising purposes is also in operation, and a brief description of the method employed may help readers in like difficulty.

Each cut is given a number. The artist work of such cut is also given the same number. Page proofs are received, of approximately twelve different machines to a sheet, and the number given to each machine is marked directly underneath its photograph. When desiring to make up an advertisement, these sheets are looked over, the cut desired is easily secured by tracing it from the number underneath, when, on shelves where the cuts are stored, one can in a moment obtain the cut required. Should same not be on shelf, a card will be in its place, showing where the cut has gone, and when it should be returned.

There is also an upper filing system

directly above the toilets. This platform, together with file rack, is used for correspondence, etc., which is not often referred to. A stairway placed at one

and sections are devoted to each style and size of machine. By this means it can be told instantly if pattern required is at foundry, and when it went. Should

effect. Running down the centre of entire length of the building is a crane runway, on which are installed three travelling cranes, one of these, three ton capacity, the other two of five ton. All cranes are hand power.

On each side of the shop for a distance of 100 ft. are placed monorail cranes of two ton capacity, these being used for assembling purposes. There is also a three ton hand power travelling crane in the casting cleaning department, so it can be easily realized, the lifting problem has been thoroughly gone into.

The Tool Room

Half way down the shop is the tool room. Figure 5 gives a good idea of its general appearance as it appears from the main aisle of shop. One side of the interior of this room is devoted to the lathe department, tools, etc. Here, arbors, dogs, tool holders, and other necessary lathe attachments are to be found systematically arranged.

Another wall takes care of the drilling department, all necessary drills, reamers, and other required tools being placed in separate shelves and sloping racks. The front wall of tool room is arranged with the usual type of wicket opening, while the fourth and last wall is devoted to a bench, on which all tool repairing is accomplished. A drill grinder, sensitive drill, and universal cutter, and reamer grinder completes the tool equipment.

Shipping Facilities

At the extreme end of the building there is a large shipping platform, made of concrete, with scale bedded in the same. Double doors open directly from

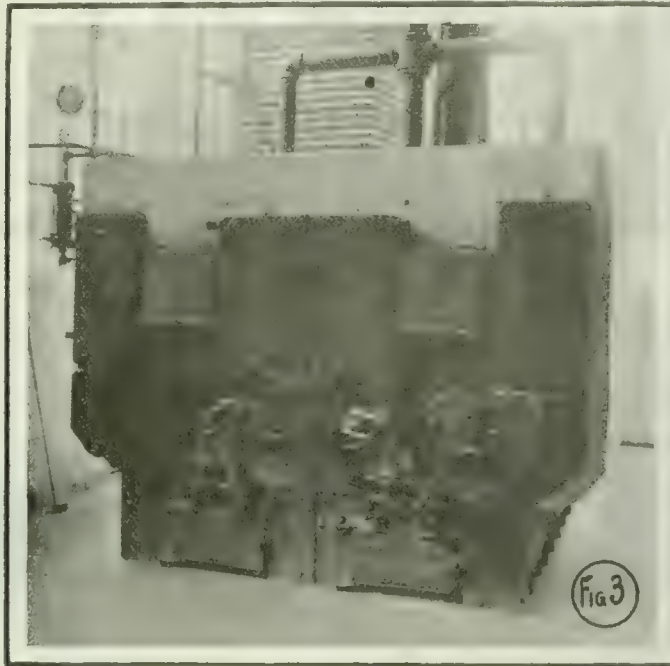


FIG. 3 BOILER ROOM TO THE RIGHT OF THIS PICTURE, AND LOWER THAN FLOOR LEVEL, IS PLACED THE AUTOMATIC ELECTRIC WATER FEED PUMP.

corner of the office leads to this filing portion.

The layout of the plant is such that one can go directly from the main office into the plant, or vice-versa, a passage leading between these two points.

Wash and Clothes Room

The view Figure 7, clearly illustrates that the wash basins are, if anything, slightly larger than the usual style, in fact each basin is used by four men. Clothes cupboards are built all around the wall, and in these the workmen have ample room to hang their apparel.

Drawing Office

Directly above the wash room, and entered into by a special stairway is the drawing office. Once more the splendid lighting scheme is noticeable to a marked degree. Six large windows supply the light for this department. The result is a room bright, and cheerful to work in, something which helps to bring out the best efforts of their designing staff. Separate toilet is also part of the equipment, and three large radiators supply the heating arrangement.

Pattern Storage and Stores Department

Close attention is called to the photograph Figure 4, showing the method of keeping track of store supplies. As will be noticed all parts are stored in separate shelves, and by means of a card system, the store attendant can tell just how his stock stands.

In this way they are assured of keeping their stock up-to-date in all particulars, without any overlapping of orders.

Combined in this room is the pattern storage department. The same system applies to this work. Special shelves

a change of pattern be necessary, by this means, it becomes a simple matter to know exactly at what period of manufacture such change occurred.

General Machine Shop

Entering the machine shop, it is easily seen that system has been used to good



FIG. 4 STOCK STORAGE RACK. NOTE THE SYSTEM OF CLASSIFYING THE VARIOUS ARTICLES.

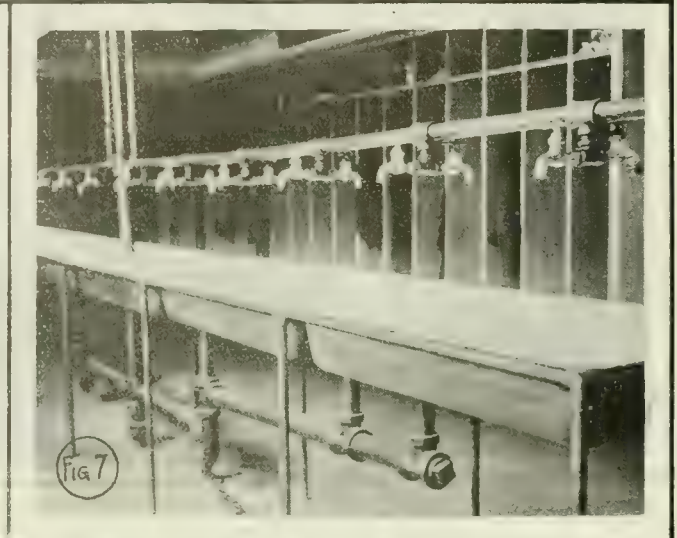
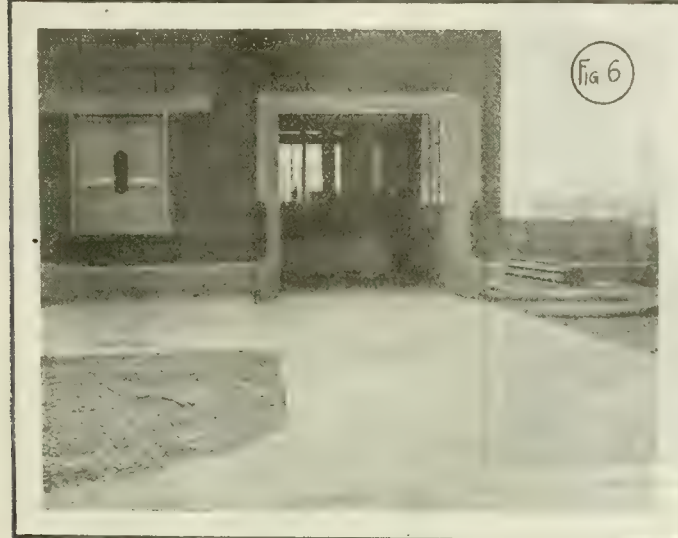
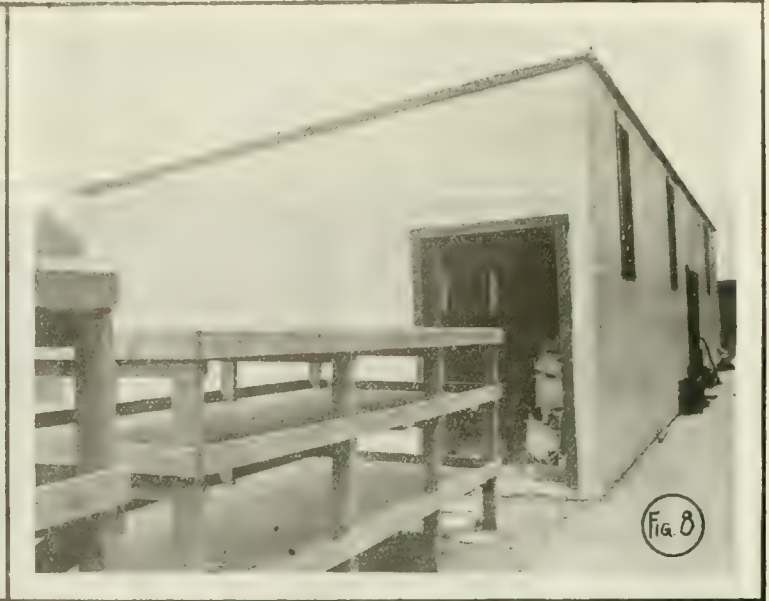
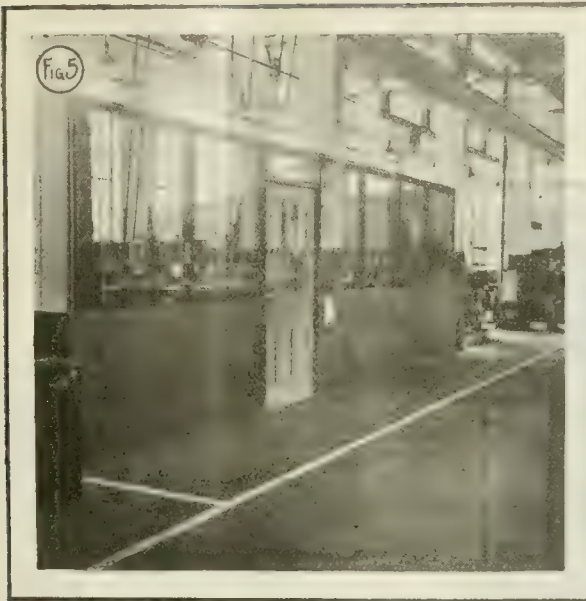


FIG. 5—TOOL ROOM, AS IT LOOKS FROM MAIN AISLE OF SHOP
FIG. 6. GENERAL APPEARANCE OF SHIPPING DEPARTMENT
LOOKING FROM THE OUTSIDE

FIG. 8—CASTING SHED AS IT APPEARS FROM AN OUTSIDE VIEW
FIG. 7. EMPLOYEES' WASH AND CLOTHES ROOM



FIG. 9 A GENERAL VIEW OF LATHE DEPARTMENT

FIG. 10.—GENERAL VIEW OF MAIN AISLE OF SHOP. TAKE PARTICULAR NOTICE OF SAFETY-FIRST LINES

this platform to the railway siding, while another set of doors open to the street, to allow teaming, and trucking to enter. The photo, Figure 6 shows clear-

ly the view of the latter mentioned entrance as it appears from the street. Readers will notice the smaller door, for the light delivery waggons.

Heating Arrangement

Figure 3 illustrates the heating system, the same being a Spencer boiler, with automatic water feed electric

pump. The automatic feature of this pump is well worthy of attention.

About 10 ft. from the floor on a post near the boiler are placed two lights, the lower one being white, the upper red. These are connected as follows: The lower light must at all times keep burn-

Lathe Department

Another noticeable feature is the system of machine grouping adopted, and this is noticed particularly in the lathe department, Figure 9. Here are placed complete batteries of lathes, but not haphazard as unfortunately is usually

advantages or disadvantages over the former position were properly threshed out.

The result of course was a foregone conclusion, namely that at the finish they had an ideal arrangement, each machine being in its best possible position. True some time was spent on this idea, but it's much easier to move a piece of cardboard than a machine, countershaft and all, so readers, especially if considering a new plant, will do well to think this idea over carefully.

The Floor

Another point worth while is the construction of the floor. A cement bedding is provided, with hardwood strips about 2 in. to 3 in. width on top of this cement. Such a floor stands up well under use, and is easy on the workmen's feet. At each radial drill is a large pit, cemented all around, and covered when not in use by a trap door, with rung attached, so that to lift the door up is the matter of a moment's work.

Toilet Arrangement

This usually neglected portion, has in this case received special attention. The sanitary feature has been kept to the fore. All toilets are of a one piece porcelain design, the complete bowl being in one piece only,—with no wooden seat. Each toilet is a separate compartment, and all necessary attachments are provided. Automatic flushers are also part of this portion of the plant.

Yard and Its Uses

To the west of the building is a large spacious yard, which is used for general storage purposes. It is here that the larger castings are placed and seasoned, before they are allowed to be machined. In this yard are also built the cutting-off department, the forging department, and the small carting storage racks and shed.

The Cutting-Off Department

In this building are placed hack saws of various. The material used is stored in special racks for the purpose, each size being in its own particular rack. Their method of handling this work is also worth the reader's attention. The operator of this department, receives instructions for sufficient steel for some particular size of miller, suppose for example we say the No. 2 size, and that there are twelve machines on the order.

He has special steel cutting specification sheets, which show him all the steel pieces used on this size of miller, also their length and size. He simply multiplies this by twelve, and goes ahead and cuts off all his material as required. It is then tagged before going out to the shop.

At Figure 8 is shown the small casting shed with the storage racks in the foreground. It will be noted that this building is of corrugated iron construction. In here are racks, and shelves to aid the storing of these smaller castings, so that when required they are easily obtained. The method of arranging them will be taken up in a later article in CANADIAN MACHINERY.

Continued on page 257

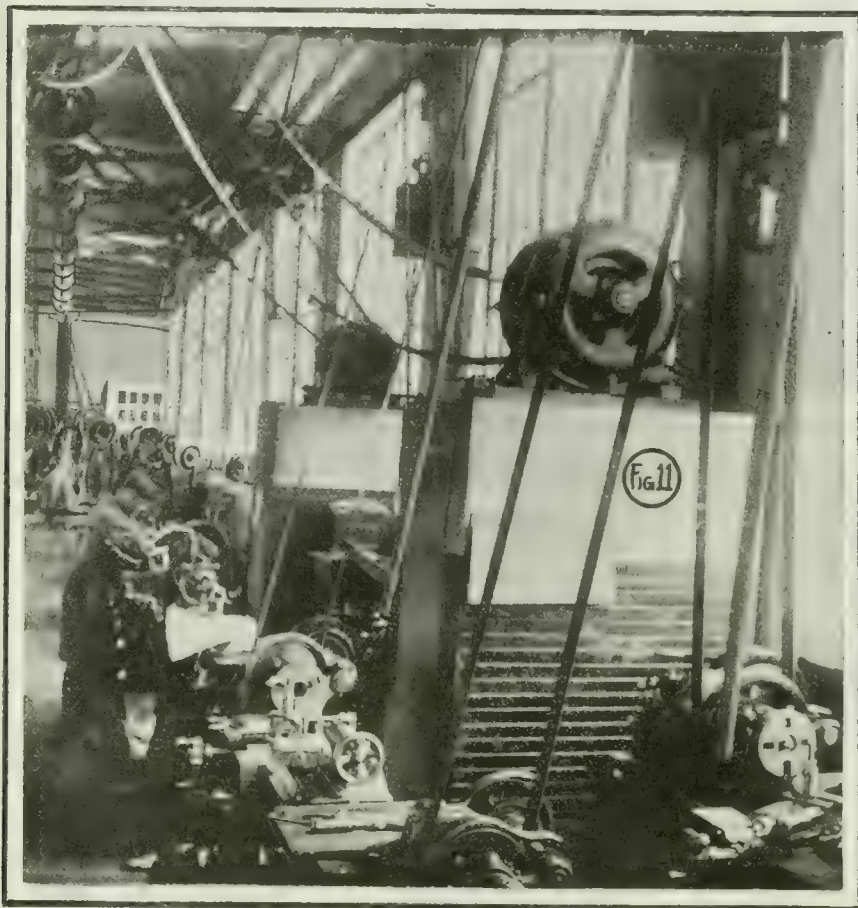


FIG. 11 VIEW SHOWING THE MOTORS OF BOTH HYDRO AND CATARACT POWER. NOTE, THE ONE BELT IS NOT IN OPERATION

ing, it being connected to the shop system of power. The fact of its being lighted illustrates that the power line is O. K.

The upper red light, if the pump is operating properly, should light every 7 minutes, and stay lighted about half a minute. Should it stay alight for more than this time, it shows that there is too much water in the boiler, on the other hand if it don't light every seven minutes there is not sufficient water in the boiler, and of course a great danger of the tubes burning out. The idea of the upper light being red, is in order that it can be easily noticed from any part of the plant, for immediately on its lighting the red glare in contrast to the white below is clearly noticeable.

The whole system is electrically controlled, a clapper box being also attached to the same post as the lights. The pump itself is placed in a pit, underneath the floor, and covered in with special hinged cover, so no obstruction is placed around the boiler whatsoever.

Directly outside the boiler section, are constructed the coal sheds, which make it very convenient for the engineer. Radiators are hung all along both the east and west walls of the factory.

the case. System has been used to splendid advantage in this work, for each lathe has its proper position in relation to the operations, as they follow through the shop.

The turret lathes have their special corner, while the various type of lathes, as used, each have their proper place, and work to do. Such an idea as this is well worthy of more attention than is usually given by manufacturers starting up a new plant. Before a machine was ever moved into this building, there was drawn up a plan view of the building. Each machine was measured to see what floor space it would occupy. Small pieces of cardboard were cut to suit the shape of machine, on the same scale as the drawing was made. When all machines had been accounted for each piece of cardboard was marked what particular machine it represented, for all machines have what is known as a shop number. Next an ordinary pin was placed in each machine outline, and the juggling commenced.

For over a week, each executive head had a shot at the scheme, all moving the machines around as a new thought struck them, after which a discussion started as to why the change had been made. Its

Shop Arithmetic—Underlying Principles

The Beginning of a Course in Practical Mathematics For the Mechanic and Those Learning the Machinists' Trade—The Present Article Deals With the Principles Upon Which Arithmetic is Based

By J. H. RODGERS

IN the present day of remarkable industrial progress it might be surprising to know that a very great number of the mechanics that are directly responsible for these achievements are, to a large extent, non-conversant with the elementary requirements necessary for their successful attainment. Many present-day workmen are relatively well informed regarding the more practical side of their daily mechanical duties, but a comparatively small number have a very wide conception of the fundamental essentials that are prime factors in the ultimate evolution of mechanical movements. It may be true that modern manufacturing methods eliminate, to a large extent, the necessity of the average workman acquiring the technical knowledge that forms the foundation of the engineer's position, but it is this very condition that adds to his dependency and prevents him from grasping the opportunity that might present itself if he was better acquainted with some of those technical details, which to him are frequently a source of annoyance owing to his lack of understanding.

An indisputable fact that is quite evident in present day industrial life, is the large number of workmen, some of them expert mechanics, that are unfamiliar with the mathematics pertaining to the work that they are called upon to perform daily. It may be said that a knowledge of such details is not necessary for the workman in order that he may be able to perform the duties in hand. This may be perfectly true—for him—but nevertheless that very knowledge is the keystone that maintains the equilibrium of every mechanical accomplishment. Without it work may be performed, but of a character remote from engineering practice, for even the most insignificant detail of mechanics might well be considered an impossibility if disassociated from what is termed the technic of the profession. Virtually, no part of mechanical enterprise is possible of accomplishment without the application of figures or calculation, in some form or other. Higher mathematics are not essential for the average workman, but it is highly desirable that every apprentice and mechanic should become familiar with the elementary theoretical principles and the calculations that underlie the actual performance of the work.

In the preparation of a course in practical shop arithmetic it will be necessary to start at the beginning and gradually advance through the preliminary stages so as to make the student familiar with those elementary principles that are essential to the solution of every shop

problem that may in any way require the application of figures for its successful completion. In the compilation of this series it is the intention of the author to deal with the matter in such a manner that the average workman will be able to follow the studies with comparative ease as the examples will, as far as possible, be confined to the solution of practical problems that are continually met with in every-day machine shop practice. In connection with this series of instruction papers it is also intended to provide a number of charts that will contain in condensed form the actual data and formulae that are required for the solution of all the problem of a like character to those dealt with in the course. These charts will be of uniform size so that they may be cut out, if desired, and kept in a suitable file for ready reference, making as it were, a loose-leaf text book.

It is supposed that the student is quite familiar with the rudiments of mathematics, such as the four elementary stages, namely, addition, subtraction, multiplication, and division. These details therefore will not be dealt with in their entirety, but in order that the course should leave nothing to be guessed at, a brief summary of these fundamentals will be given.

Every whole (integer) number will have one or more characters (figures) and the value of these figures depend upon the position they occupy in the number. Numbers are divided into groups of three figures each, each group having a term to signify its value. These groups are units—thousands, millions, billions, trillions, etc. Each group is subdivided into units, tens and hundreds of its respective term, as shown in Chart 1. The lower line of small figures in this chart represents the position of each term in the number. The portion of a number to the left of the decimal point is called the integer or whole number, while the portion to the right is termed the decimal part of a unit of which the number is composed. The treatment and disposal of the decimal part of numbers will be taken up later. In reading a number (termed numeration) that has been expressed in figures, it is well to divide the number into divisions as shown in the chart, commencing at the right or unit position, and having three figures in each division. This can be done mentally and quite accurately after the student is accustomed to large numbers, but it is advisable for the beginner, and in fact at all times, to make some significant mark to distinguish the value of the number. After marking the number off into divisions,

start at the left and express the figures indicated as though they were units of the primary division and then give them their proper term value; continue this process until the number is finished. Thus:

87423

which would read, eighty-seven thousand, four hundred and twenty-three. Or:

306028

would read, three hundred and six thousand and twenty-eight.

The integral portion of the number in Chart 1 would read: Six hundred and fifty-four trillions, three hundred and twenty-one billions, nine hundred and eighty-seven millions, six hundred and fifty-four thousands, three hundred and twenty-one.

The simplest form of calculation, apart from the actual notation and numeration of the figures, is the process of addition—or finding the sum of two or more numbers. To reduce the amount of work in all mathematical problems, the adoption of certain signs and symbols have been of material assistance in solving questions more rapidly and accurately. In order that accuracy be assured it is advisable to maintain a systematic arrangement of the figures when calculations are being carried on. This is imperative in the case of young students to prevent mistakes that may frequently occur from the irregular placing of the figures when working out a problem. In addition and subtraction extreme care should be taken to place the figures under each other and in the position so that digits of the same power value will be in the same vertical line; units under units, tens under tens, etc. It is difficult to state any fixed rule for addition, as accuracy and speed are only acquired by constant practice and application. In adding up a column of figures it is often of advantage to group the figures in the process. This can be done mentally.

Subtraction is the process of finding the difference between the two numbers and is so simple that further explanation here is unnecessary.

Multiplication is the process of adding a certain number to itself a stated number of times, but it is not performed in the same manner as ordinary addition. For instance, suppose we desire to find the total weight of 18 shafts, each weighing 55 lbs, this could be done by placing 55 down eighteen times and adding, but it is quite evident that the process would be very tedious and entail considerable

effort. When multiplying extract numbers, the lesser of the two is usually taken for the multiplier, as

$$\begin{array}{r} 426 \\ \times 23 \\ \hline 1278 \\ 852 \\ \hline 9798 \end{array}$$

$3 \times 5 = 15$

but with concrete numbers it is good practice to arrange the numbers so that the product and the multiplicand are of the same denomination. For example, in the above problem, where it is desired to find the weight of the 18 shafts, the question would be arranged thus:

$$\begin{array}{r} 55 \times 18 \text{ or } 55 \text{ lbs} \\ \times 18 \\ \hline 440 \\ 990 \\ \hline \text{Total Weight } 990 \text{ lbs} \end{array}$$

The same would apply in the case of finding the circumference of a pulley 22 inches in diameter, as it is inches that is required. However, the process of multiplying can be reversed to shorten the work, thus:

$$\begin{array}{r} 4 \quad 2.2 \text{ in.} \\ 6 \quad 3.1416 \\ \hline 62832 \\ 62832 \\ \hline 69.1152 \end{array}$$

$4 \times 6 = 24$

in which the constant 3.1416 is multiplied by the number 22. The constant 3.1416 is the ratio of the circumference to the diameter of a circle.

Division is the reverse of multiplication and is the process of finding how many times one number is contained in another. Division is usually performed by one of two methods—short or long division—the first generally adopted when the divisor contains one digit only. A bar 11 feet 4 inches long is to be di-

vided into eight equal pieces; what will be the length of each piece? The solution is as follows:

$$\begin{array}{r} 11' \quad 4" \\ \times 8 \\ \hline 136 \text{ in.} \\ \hline 17 \text{ in.} \end{array}$$

Suppose, however, that 38 uniform castings have a total weight of 1,824 lbs., and it is required to find the weight of a single casting. In this case it would be necessary to use the method known as long division:

$$\begin{array}{r} 38 \overline{) 1824} \\ \underline{152} \\ 304 \\ \underline{304} \\ 0 \end{array}$$

$(2 \times 3) + 0 = 6$

COURSE IN PRACTICAL SHOP ARITHMETIC CHART I.

I.		Trillions	Billions	Millions	Thousands	Units			Ten Thousands	Hundred Thousands	Millions
Hundreds of -	Tens of -	Units of -	Hundreds of -	Tens of -	Units of -	Hundreds of -	Tens of -	Units of -	Hundreds of -	Tens of -	Units of -
6	5	4	3	2	1	9	8	7	6	5	4
15	14	13	12	11	10	9	8	7	6	5	4
3	2	1	0	9	8	7	6	5	4	3	2
0	9	8	7	6	5	4	3	2	1	0	9
8	7	6	5	4	3	2	1	0	9	8	7
7	6	5	4	3	2	1	0	9	8	7	6
6	5	4	3	2	1	0	9	8	7	6	5
5	4	3	2	1	0	9	8	7	6	5	4
4	3	2	1	0	9	8	7	6	5	4	3
3	2	1	0	9	8	7	6	5	4	3	2
2	1	0	9	8	7	6	5	4	3	2	1
1	0	9	8	7	6	5	4	3	2	1	0
0	9	8	7	6	5	4	3	2	1	0	9

An **abstract number** is one that makes no reference to a quantity or object—as three (3), eight (8), fifty-six (56), etc.

A **concrete number** is one associated with an object to designate its value—as three (3) days, eight (8) pulleys, ninety-four (94) feet, etc.

Notation is the practice of expressing numbers or terms by means of figures, letters or symbols.

Numeration is the science of reading numbers or

terms that have been expressed in figures, letters or symbols.

A **whole number** is called an **integer number**.

The value of a figure depends upon its position in the number.

When standing alone it has a **unit** or **simple value**.

When part of a number the value is **local** or **relative** and is determined by its position.

The extreme right hand figure of an integral number is in the unit position; each position to the left increasing the relative value ten times that of the position immediately to the right.

Addition is the process of adding together two or more numbers.

Subtraction is the process of finding the difference between two numbers.

Multiplication is the process of multiplying one number by another, or adding one number to itself a certain number of times.

Division is the process of finding how many times one number is contained in another, or subtracting a number from itself a certain number of times.

2. ARITHMETIC			
Addition	Proof	Subtraction	Proof
$\begin{array}{r} 986245 \\ 70231 \\ 8206 \\ 98320 \\ 56035 \\ 2874 \\ \hline 1221911 \end{array}$	$\begin{array}{r} 34 \quad 7 \\ 13 \quad 4 \\ 16 \quad 7 \\ 22 \quad 4 \\ 19 \quad 1 \\ 21 \quad 3 \\ 17 \end{array}$	$\begin{array}{r} 8305624 \\ 596258 \\ \hline 7709366 \end{array}$	$\begin{array}{r} 28 \quad 10 \quad 1 \quad (a) \\ 35 \quad 8 \quad (b) \\ 38 \quad 11 \quad 2 \quad (c) \end{array}$
$\begin{array}{r} 468235 \\ 42791 \\ \hline 468235 \\ 4214115 \\ 3277645 \\ 936470 \\ \hline 1872940 \end{array}$	$\begin{array}{r} 28 \quad 10 \quad 1 \quad (a) \\ 23 \quad 5 \quad (b) \\ 5 \times 1 = 5 \\ 41 \quad 5 \quad (c) \end{array}$	$\begin{array}{r} 468235 \\ 42791 \\ \hline 468235 \\ 4214115 \\ 3277645 \\ 936470 \\ \hline 1872940 \end{array}$	$\begin{array}{r} 28 \quad 10 \quad 1 \quad (a) \\ 23 \quad 5 \quad (b) \\ 5 \times 1 = 5 \\ 41 \quad 5 \quad (c) \end{array}$
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In what has been explained so far, and in fact in all calculations, the accuracy of the work depends very largely on the concentration of the student and the knowledge and speed he has acquired in the mental use of the addition and the multiplication tables. However, the work on many mathematical problems can be readily checked to test their accuracy. Probably the most simple and effective method is that of "casting out the nines." In the case of addition the digits in each number are added and the sum divided by 9, the remainder being placed to the right of the number, as shown in Chart 2. This is done with each number in the sum and the remainders added together, and this sum again divided by 9, the final remainder being placed to the extreme right. The same process is followed with the answer and the remainder should correspond with that previously found. If not, the addition is incorrect.

Subtraction may be proved by adding the subtrahend and the remainder, or by casting out the nines as shown in the chart.

In multiplication the final remainder (by cross addition and subtraction) of the multiplicand and the multiplier, are multiplied, and the "nines" extracted; the remainder should correspond with that found in the product.

In division the proof is found by adding the remainder in the remainder to the product of those found in the divisor and the quotient; the result, after extracting the "nines" should coincide with the remainder as found in the dividend.

This process of proving calculations may seem long and complex, but once the student is familiar with the method, the time required is insignificant. As a matter of fact, the application of the proof can be greatly simplified by a mental process of extracting those digits that have nine or a power of nine for their aggregate sum. For instance, in the multiplication problem in Chart 2, it will be seen that, in the first line, 5 and 4, 6 and 3 can be eliminated, leaving 8 and 2, which will leave 1 after extracting the nine. In the second line, 9, 2 and 7 can be eliminated, leaving 4 and 1, that total 5. The same with the product 3 and 6, 2, 4 and 3, 8, 8 and 2 can be eliminated, leaving 5. The two remainders being equal proves the correctness of the work.

PERFECTION IN DISINFECTANTS

It is stated that since the New York Department of Water Supply added a small amount of chlorine to the water not a single case of typhoid fever has occurred which could be traced to the city water. A far more remarkable achievement in water purification, however, is presented by the equipment devised by British chemists for the use of the army in France. It was so perfect that an equipment on a barge could pump foul water from a canal and deliver it in large quantities purified for drinking purposes. In view of the New

York success, it is proposed that chlorinated water be used for sprinkling the streets to prevent the spread of infection. This proposal has been anticipated to some extent by the Poplar Borough Council in the east end of London which for many years has provided, under the direction of the Medical Officer of Health, free supplies of such disinfectant produced by an electrical process. It is freely used for public baths and wash-houses, for cleaning hospitals and other public institutions, for flushing drains, and for other sanitary purposes. Electricity is passed through a solution of certain salts, converting the liquid into an effective non-poisonous disinfectant which can be stored unimpaired for long periods.

PREVENTING DISTILLATION

It is highly important, in burning soft coal, to avoid distilling off its volatile constituents so that they can pass out through the stack without burning. Some coal contains enough tarry or oily matter of this kind to give it an almost greasy character. Coal gas is produced by heating such coal in a closed space or retort; and by reflecting upon this fact some idea may be had of the cost of distilling the volatile portions of such coal wastefully in a boiler furnace. To avoid losses of this kind so far as possible, care should be taken to feed the coal into the furnace in small quantities, to keep the fire fairly bright at all times, and to see that sufficient air is introduced to permit the volatilized constituents to be properly consumed. When these volatile constituents escape unburned, they are usually accompanied by smoke; and the rich yellowish color that is often seen at the top of the chimney when burning bituminous coal is a sure indication of their presence in considerable amount. The yellow hue is often masked, however, by the dense black smoke that may be given off at the same time. In a rough way it may be said that freedom from yellow or black smoke shows that no very large quantity of volatile matter is being distilled unburned; for while this test is not altogether accurate, it is good enough to be of material help to the fireman in bad cases.

A NEW SYSTEM OF ELECTRIC PLOUGHING

Several methods have been devised for applying electric haulage to ploughs, and the latest is a British invention which shows great originality and ingenuity. It serves three purposes, ploughing, drainage and transport.

An inventor proposes that overhead tracks shall be erected on A-shaped steel or ferro-concrete frames so as to form parallel lines on opposite sides of ground to be cultivated. On each track is an electric traveller with a winding drum which hauls on an endless rope to which the plough or other implement is attach-

ed. By making the implement double-ended it can be hauled backwards and forwards without turning at the end of each journey. Underneath the line of A-shaped frames is constructed the main concrete drain; and the digging of mole drains leading into the main drain can be carried out by a draining machine hauled in the same way as the plough. By extending the system of overhead tracks they may be used to carry materials and produce between the field and the farm or the main road. Where the ground is undulating the level of the track is preserved by making the supports longer or shorter as required. Although this equipment may seem costly, it is not so in effect, as it includes drainage and transport and renders hedges, ditches, and roads unnecessary. The use of electric power also cuts out the necessity of carting fuel or water for field operations. For intensive cultivation on modern lines this well-thought-out invention should have a most interesting future.

THE NEW HOME OF THE FORD-SMITH CO.

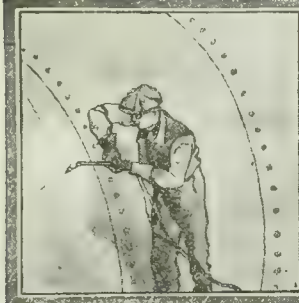
Continued from page 254

Figure 10 illustrates the general appearance of the centre portion of the shop, looking from the shipping platform end. While at this view it will not be amiss to call reader's attention to the Safety First lines marked plainly in white, for the entire length of the shop.

All castings or material of any sort must be kept clear of these lines, so that at all times there is a clear, safe passage down through the plant. This same system of clear space lines apply to all doorways, for an ample space is marked at these points also, and there is trouble if the workmen don't keep up to the agreement of keeping spaces clear. If a workman carelessly leaves his casting over the mark, it is easily traced to him, and a call down is in order.

Another special feature, is their novel method of playing safe as regards the power question. Hydro, and Cataract power are both procurable, and as it sometimes happens that one or other is out of order, they have a double motor system, so that should either of the powers give out, there is the other motor to fall back on, which merely means that one belt is knocked off, and the other placed on. Figure 11 clearly illustrates the scheme as both motors can be plainly seen, and it will be noted that one belt is at present off, while the other is in operation. The heading of this article illustrates the general appearance of the plant as it looks from the main thoroughfare.

The entire Ford-Smith plant is erected with the idea of equipping, especially for the manufacture of high grade machine tools, with their millers as the feature tool and in a further article in CANADIAN MACHINERY we will take up the subject of Ford-Smith Millers, their construction and method of manufacture.



WELDING AND CUTTING



Characteristics of Oxy-Acetylene Welds

The Author, in a Paper Recently Read Before the Institution of Mechanical Engineers, Gives Some Valuable Data Gathered From His Own Experiments Regarding Physical Properties of Welds

By J. H. DAVIES, Central Technical School, Leeds

IT IS well known to every one who takes an interest in autogenous melting and welding processes, that the existing opinion as to the value of the processes, and the practical results obtained differ widely. The chief ground for the uncertainty that exists in regard to them lies in the fact that these new processes have only recently been introduced in industrial practice, and rest entirely upon empirical bases. Although oxy-acetylene welding is now extensively practised and is of great theoretical and practical interest, it has never been made the object of systematic and exhaustive research.

The author has had eighteen years' experience in the welding process and has made exhaustive tests and long studies, not only of what is being done in this country, but also of the progress made, both in the United States and Germany, the latter country being far more advanced than Great Britain in the oxy-acetylene process. They have carried out systematic and exhaustive researches, their operators are scientifically trained, they are taught metallurgy and chemistry, including the chemical compositions and melting points of all metals and oxides; they make test-pieces for experimenting with chemical and mechanical tests, and by microscopic and macroscopic examinations, both of the melted zone and the neighboring parts. Their welding as a rule is very neat as they are not allowed to execute commercial work until they have become fully proficient and competent.

The author has undertaken many investigations in the oxy-acetylene processes on autogenous welding of various metals in general use; in doing so he has endeavored to adhere as closely as possible to conditions which accompany ordinary works' practice. The oxy-acetylene processes when properly worked possess numerous marked advantages over all others. In the first place, the operating flame can be easily controlled, and the temperature attained at various zones can be readily regulated.

In the second place, the work can be readily accomplished owing to the high temperatures reached (3,500° C). The

appliances are easy to handle and reliable in operation.

The most important conditions for securing good results are:

- (1) The use of the purest acetylene possible.
- (2) The use of a blow-pipe so designed as to ensure accurate adjustment in the proportion of the mixed gases, and to secure their exit at a velocity capable of maintaining the metal sufficiently fluid without the melting flame being too rigid.
- (3) The use of an absolutely pure welding-rod.
- (4) The provision of an absolute neutral zone in the melting flame, neither oxidizing nor reducing.
- (5) The edges must be free from all impurities, and if over 3/16 inch thick the edges must be bevelled; if over 3/8 inch the edges must be bevelled on both sides.
- (6) The use of deoxidizing agents eliminating the oxides in view of unavoidable oxidation of the metal subject to the melting process. It is necessary to bear in mind the relation between the melting points of the oxides and that of the metal itself, which is a most important matter.
- (7) Rapidity in melting in order to avoid excessive heating which will not only alter and deteriorate the original structure of the metal, but would even favor the occlusion of gas, particularly hydrogen, and so occasion the formation of blow-holes in the melted zone.

In addition to these considerations, care should be taken to see that no sudden cooling takes place. The conditions may have to be modified on account of the conductivity and specific dilation of the material, as well as to the relation to thickness, size, and shape of the pieces operated upon.

These precautions were observed in the author's experiments, and particular attention was given to the changes in chemical composition and mechanical properties by careful examination of the melted zone, and the structure of the

welded material was compared with that of the original. Experiments were, moreover, carried out on molten metals both before and after subjection to mechanical stresses, in order to ascertain to what extent, if any, the various constituents are influenced by the process. The researches were further carried out on the mechanical properties of various steels when subjected to the strong heat of the flame, without being melted, and for the same period of time as might be required for the autogenous welding of the same sized pieces.

The first experiments were carried out on boiler plate 0.393 inch thick, of which the chemical composition was as follows:

	Per cent.
Carbon	0.105
Manganese	0.510
Silicon	0.024
Phosphorus	0.025
Sulphur	0.053

The welding-rod used was pure Swedish charcoal iron, 1/4 inch diameter, practically free from sulphur and phosphorus.

After the samples were welded, some were cooled in air, others went under special heat treatment and mechanical operations, finally mechanical tests were made on rough unmachined samples; before and after mechanical tests a piece of metal was taken from the melted zone and from the neighborhood of the weld for microscopic examinations, Table 1 as follows:

A second series of the same nature were carried out on round bars of mild steel. The chemical compositions were:

	Per cent.
Carbon	0.119
Manganese	0.620
Silicon	0.023
Phosphorus	0.666
Sulphur	0.062

The welding-rod was of Swedish charcoal iron wire 1/4 inch diameter. The experiments were carried out as for the first series, except that for mechanical tests the pieces were machined to 0.472 inch diameter, this being done to compare the quality of several welds. The results are given in Table 2.

A third series of experiments were made on medium-carbon steel, using 1.022 inch diameter, machined to 0.475 inch diameter bars, whose chemical composition was as follows:

	Per cent.
Carbon	0.700
Manganese	0.930
Silicon	0.190
Phosphorus	0.049
Sulphur	0.057

Welding-rods were used containing 0.600 per cent. carbon, and during the welding a deoxidizing and descorifying powder was used, consisting essentially of sodium carbonate, Table 3:

which often proves to be most injurious to high-carbon steels, but must be coupled by proper thermal treatment, such as annealing carried on for thirty or forty minutes; further quenching has also the greatest influence on high-carbon steels.

(3) A remarkable influence on the mechanical properties is to be attributed to cooling processes, the slowest cooling being the best and most efficient.

(4) Apart from the alteration in mechanical properties, very important modifications take place

lene welding and cutting process, it is not difficult to appreciate its varied applications and important advantages, especially in time of war, and the author feels quite justified in saying that the present war has given a stimulus to oxy-acetylene welding, which ten years' ordinary industrial progress would never have done.

The ease and rapidity with which experienced welders can carry out repairs *in situ*, and the portability of the plants, make the process valuable, if not indispensable, at the front. The service rendered by this process in the many workshops attached to the armies is particu-

TABLE I

Sample	Orig. Thick.	Mach. Thick.	Thermal Treatment.	Break Stress Tons per sq. in.	Elongation on 2 inches Per cent.	Metal Per cent.	Welded Zone. Per cent.	Cold Bend.	Notes.
1	0.393	0.236	(Heated and cooled in air.)	23	16.6	.....	.....	.....	( Subject to high temp. of flame.) (Not welded.)
2	0.393	0.236	(Heated and tempered to 900° C. for 20 mins.)	23	19.7	.....	.....	.....	Do.
3	0.393	(Not mach.)	Welded only.	19	5.8	(C. 0.125 Mn. 0.40 Si. 0.047)	(C. 0.07 Mn. 0.32 Si. ....)	.....	(Broke through weld.) (Grain coarse.)
4	0.293	0.236	Do.	.....	.....	.....	.....	(180° without) (trace of flow. )	.....
5	0.393	(Not mach.)	(Not hammered.) (weld slowly cooled.)	23	13.5	.....	.....	.....	(Broke at weld, fine.) (Slightly fibrous structure.)
6	0.393	0.236	Do.	22.8	14	.....	.....	(180° without) (trace of flow. )	.....
7	0.393	0.236	(Welded and air-cooled. )	.....	.....	.....	.....	(160° flow at weld. )	.....
8	0.393	0.236	(Tempered 20 mins. to 980° C.)	23.4	10.5	.....	.....	.....	( Broke at weld.) (Grain Coarse.)

TABLE II

Sample.	Thick. Orig.	Thick. Mach.	Thermal Treatment.	Break Stress. Tons per sq. in.	Elongation on 2 inches Per cent.	Metal. Per cent.	Weld Per cent.	Cold Bend.	Notes.
1	0.786	0.472	(Tempered to 900° C. for 20 mins.)	28.7	30	.....	.....	.....	Not welded
2	0.786	0.472	(Heated to incipient smelting of surface.)	27.4	28.5	.....	.....	.....	Do.
3	0.786	0.472	(Slowly cooled.)	26.2	1.3	(C. 0.125 Mn. 0.40 Si. 0.0)	(C. 0.08 Mn. 0.29 Si. ....)	.....	( Broke at weld.) (Rough granular structure.)
4	0.786	0.472	(Heated and hammered slowly.)	24.6	10.0	.....	.....	.....	( Broke at weld.) (Inner, fine. Outer, coarse grains.)
5	0.786	0.472	(Cooled in air.) (Annealed 900° C. for 40 mins.)	27.0	29.0	.....	.....	.....	Broke outside weld.
6	0.786	0.472	(Cooled slowly.) (Hammered hot.)	27.4	26.3	.....	.....	.....	Do.
7	0.786	0.472	(Annealed 900° C. for 40 mins.) (Preheated and hammered twice.) (Two consecutive anneals.) (Slow cooled.)	27.4	29.2	.....	.....	.....	Do.

TABLE III

Sample.	Orig. Thick.	Mach. Diam.	Thermal Treatment.	Break Stress. Tons per sq. in.	Elongation on 2 inches Per cent.	Weld Per cent.	Metal. Per cent.	Cold Bend.	Notes.
1	1.022	0.473	(Heated and cooled.) (Heated)	54.3	13.6	.....	.....	.....	(Subjected to high temp. of flame.)
2	1.022	0.473	(and tempered to 900° C. for 20 mins.) (Slowly cooled after welding.)	55.9	16.1	.....	.....	.....	( Not welded.) (Not welded.)
3	1.022	0.473	(Heated and hammered after welding.)	37.8	2.1	.....	.....	.....	( Broke at weld.) (Rough grain structure.)
4	1.022	0.473	(Cooled in air.)	36.2	0	(C. 0.60 Mn. 0.91 Si. 0.20)	(C. 0.28 Mn. Si. 0.10)	.....	Do.

Summarizing these observations on carbon steel shows that:

- (1) The violent heating and the sudden melting undergone by the metal profoundly alter its quality.
- (2) The alteration in the mechanical qualities (tenacity and elasticity) cannot be remedied by simple hammering on the melted zone

in the chemical constitution; these changes consist chiefly in diminution in the percentage of carbon, silicon, and manganese, but the author thinks that this defect may be modified by using a welding-rod with a higher percentage of these oxidizable elements.

For those familiar with the oxy-acety-

larly valuable, where the welding of articles of all kinds is a daily necessity.

The oxy-acetylene process occupies a leading place in the aeroplane and airship industries; it has the advantage over all other systems of joining, in diminishing the weight of parts, so that parts previously made from wood or aluminum castings are now made both

lighter and stronger from sheet and steel tube. The frequent repairs to engines and other details, including the repair of cracked cylinders and broken aluminum crank and gear cases further emphasize the new power the process offers to the aircraft industry. Further, the value of cutting with this process has no rival whatever, and the ravages of warfare open up an extensive field for it, both during and after the termination of the war. The demolition of bridges and steel structures blown up by the Allies or enemies is an important application of this process. The cutting of armor-plates again emphasizes its unique field of usefulness.

The oxy-acetylene flame has recently been applied to the case-hardening process, and some firms are using this on a large scale. It is well known that the flame containing an excess of acetylene is a very energetic carbonizer. If the flame is held for a period of two minutes on the white-hot surface, a hardness equal to that obtained with the most energetic case-hardening mixtures is obtained; if this is prolonged from five to ten minutes, it will penetrate to $\frac{1}{8}$ inch depth.

The many advantages oxy-acetylene has over other processes may be summarized as follows:

It can be applied to almost any class of work; it can weld 30-gauge steel or $1\frac{1}{2}$ inch thick boiler-plate; it can cut mild steel up to 24 inches thick, and it will weld any commercial metal such as cast-iron, aluminum, copper, bronze, lead, zinc, etc.

In the repair of broken machinery and parts, it has no rival, the repairs can be executed quickly, and many repairs may be executed without dismantling, the cost in many cases is infinitesimal, compared to the cost of a new part.

It can now be used with advantage, in the manufacture of safes, tanks for oil, caustic soda, or other solutions, the jointing of pipes, steam-superheaters, metal casks, petroleum barrels, artistic iron-work, adding metals to parts worn by friction, filling up holes or parts of new structures cut away in error, welding of tool-steel ends to common steel bars for turning and cutting tools, the welding of copper, brass or iron tubes.

The equipment is extremely portable and can be used within a few minutes of being loaded, the power of the heating flame can be far more accurately regulated than electric current. The flame can be used for preheating, hammering, and annealing after welding, thereby insuring a uniform soft metal, a method not practicable in the electric process.

In the welding of light sheet steels it has an unrivalled field; with 24-gauge metal, 45 feet per hour can be welded, with a consumption of only 4 cubic feet of oxygen and 3 cubic feet of acetylene. On the other hand, when the metal reaches $\frac{3}{8}$ inch thick or over, electric welding has the advantage both in speed and cost.

When the process of oxy-acetylene welding was first introduced into this

country, its apparent simplicity led many engineers wrongly to assume that welding appliances might be regarded as general workshop tools, which any inexperienced but handy man could operate with success; consequently much work has been condemned wholesale because of defects in the weld, but the author would emphasize that this is not the fault of the process, but of inefficient workmen. To-day the business has grown beyond the limit of personal supervision, and the necessity for organized instruction of operators is becoming more and more obvious, both in the interests of workmen and employers.

Welding schools are now established in various centres, and a stream of fairly qualified welders is already flowing from these schools into workshops. They teach the students under practical conditions of the kind of flame for different work, the principles under which the blow-pipes are constructed, the way to handle them, and a variety of practical and technical points which are bound to be most helpful to them in their subsequent career. No man should be regarded as a competent operator until he has a clear and intelligent understanding of all points appertaining to the process; he should be a fair metallurgist and chemist, and know the melting points of all metals and oxides and chemical compositions, and be conversant with mechanical and thermal tests.

There are estimated to-day to be not less than 30,000 employees in this country working the process of oxy-acetylene welding; 20,000 of these entered the field since the war began. Of the total number 90 per cent. are not fully skilled, that is, they are incapable of executing satisfactory welds on all metals, being mostly employed on sheet steel work for war purposes. The impetus that has been given under war conditions should stimulate employers at the conclusion of hostilities to investigate and exploit this revolutionary process, whose vast possibilities have no obvious limits.

In the shipbuilding trade this process can be utilized a hundredfold more than at present; for instance, in making of knee-brackets, stays and frames, these can be all cut and welded by blow-pipes, with present costs reduced, and output increased; a blow-pipe only requires one man, but an angle-smith, when welding a knee-bracket requires two or three assistants. The author only mentioned this one item, but there are dozens of others; most shipyards have plants, but they are not often utilized to advantage, for they must either employ skilled welders or call in an expert to advise.

This process is not being neglected in some works, and those who have grasped its possibilities consider it a unique labor-saving tool. The author personally knows of a locomotive shop, where twenty welders are employed, and 6,000 feet of piping have been installed for carrying gases to all the shops. They have more than 400 locomotives in use with welded fire-boxes, and 500 welded engine-frames, and they have reclaimed in one month 157,082 bolts, thus saving

£400 compared with new ones. Repairs to the shop tools, machinery, etc., are common, and excellent results obtained; the housing for a large roll was repaired by this process, welded in a day and a half; a new housing could not be obtained under six weeks. A planer broke whilst operating on a cylinder of an engine; a new part could not be got under ten days, but with the blow-pipe the part was welded and the planer at work in two hours and forty-five minutes. These examples might be multiplied considerably.

AUTOMATIC TELEPHONES IN GREAT BRITAIN

Before the war the British Post Office had embarked on the conversion of several telephone exchanges from manual to automatic working. The substitution of machinery for the telephone girl proved so successful that the Department is certain to continue its interrupted programme. The automatic principle is also being used for intercommunication telephones in large factories, business houses, hospitals, and so on, and a number of British firms are fully equipped for the production and installation of the apparatus. Australia House, the headquarters of the Commonwealth Government, is equipped with automatic telephones which give a rapid and secret service equal to that of a public exchange in miniature.

BRITISH ELECTRIC BATTERY LOCOMOTIVES

Extensive use is being made in Great Britain of electric battery locomotives in factories, goods yards and other places where a considerable amount of shunting has to be done. The Ministry of Munitions ordered a large number of these machines for expediting the handling of large quantities of materials in Government works. There are many objections to the use of steam locomotives in or near factories; the noise and the emission of steam and smoke are the chief drawbacks. Where explosive or inflammable goods are stored there is also the danger of fire. Further, a steam locomotive is using power even when it is idle, and it involves a lot of time and trouble in connection with coal, water, and the disposal of ashes. The electric battery locomotive cuts out all these faults and dangers. Its equipment consists simply of secondary cells, controllers, and driving motors. The cells are charged during the idle night hours, so that the loco is ready for work in the morning. It runs quietly and can be easily driven by an ordinary workman after a short training. As it can be built with a very short base it can negotiate sharp curves with ease. The designs produced by British engineers have proved so successful that a large development of this mode of point-to-point haulage is expected.



WHAT OUR READERS THINK AND DO



Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

Is the Engineer a Business Man?

The Status of the Engineer, Particularly in Production Work, is in Many Cases That of a Business Man, and His Advice in Many Cases Determines the Success or Failure of New Enterprises

By D. A. HAMPSON

IN a great many concerns, the engineer is considered in purely a professional light, a necessary adjunct to the factory force—not a producer and not a man of business. His work has to do with measurements, materials, and efficient production viewed solely from the standpoint of getting more out of the wages paid to the workmen; a work that is partly conservation and preparedness and that saves thousands of dollars here and hundreds there, yet because these savings rarely appear on the books the engineer gets very little credit for them—not as much credit as the collector who turns in some hitherto bad account, which is “just like finding money.”

The engineer is not considered a “business man” for the savings he effects—in fact, he is apt to be classed with the inventor and the minister as deficient in a financial sense. The directors, the manager, the clerical and sales forces—they constitute the business end of the organization, in their own opinion at least, while the engineering staff belongs to another realm where wheels have no connection with dollars and cents. But in reality, economical plant operation or an original tool design may be more of a factor in multiplying sales, through lower costs, than the work of the sales department itself. Then, how many businesses have prospered because of mechanical foresight, how many have failed for lack of it or because the ill advice of enthusiasts has been followed instead of the engineer's judgment?

Final proof of business ability is its effect on the bank account and after a survey of various phases of engineering activity, one is forced to award the engineer a prominent place alongside his colleagues of the main office and of the road. Two recent instances that occurred in a manufacturing business will serve to illustrate. It is necessary to explain briefly some points in modern printing practice to show the relation of engineering ability to business as brought out in this case.

Is the Engineer a Business Man?

All of us have visited printing establishments of some sort and have noticed there electrotype “plates” mounted on blocks of maple or cherry; these have been usually illustrations for advertisements or “cuts” of celebrities. When the “form” is made up, these are locked in the surrounding metal frame, or “chase,” along with type, linotype and stereotype matter, and other cuts.

On account of the inaccuracies of wood, such a mounting for plates is disappearing with the tremendous strides being made in the printing art and in its place has come the metal “base” or “block” which is accurate to a thousandth part of an inch and stays so and which is used over and over again, the plate being temporarily clamped on the base for its particular “run.” Almost all commercial work is now handled in this way—books, advertising, maps, magazine covers, newspapers, etc., etc. The plates form one of the most valuable, tangible assets of a publishing

house and the equipment for mounting and holding the plates is of equal importance with the presses themselves.

The drawing shows a typical mounting of a plate. In this case the base is of the sectional unit system with “hook” units of the same size inserted wherever necessary to properly confine the plate. Other systems employ a full size, one-piece base with continuous slots for the hooks, running either at right angles or diagonally. With almost all systems, the plates have a 60 deg. bevelled edge that causes the hooks to draw the plates down as they hold.

It is generally admitted that the perfect plate mounting system for all general classes of printing has yet to be marketed and that there is a fortune in it for the firm who does produce such a system. Naturally the field has been a prolific one for inventors with the failures far outnumbering the successes. The space limitations are such that it is extremely difficult to get a hook tightening mechanism that is strong and ser-

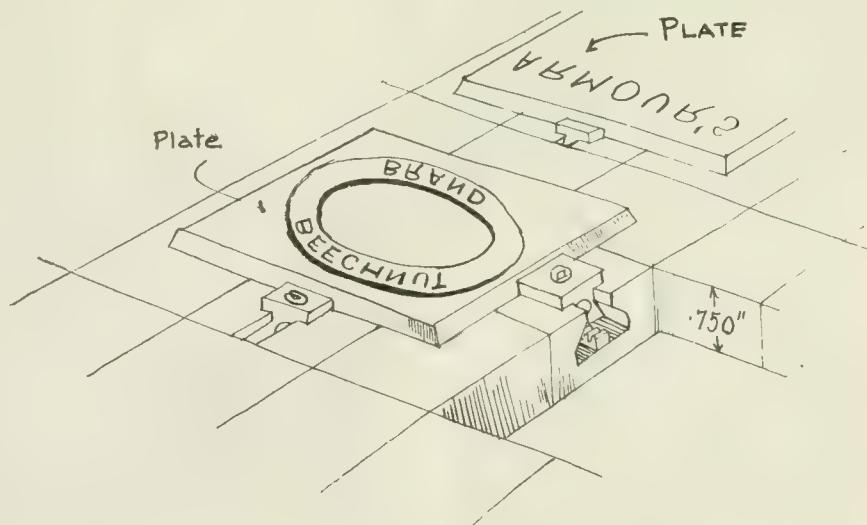


PLATE MOUNTING SYSTEM UNDER DISCUSSION

viceable without cutting away so much of the containing base as to make it weak in locking up the form and without having a slot so wide that the plates sink in it under the printing impression. These conditions are emphasized by referring to the drawing, by knowing that at modern press speeds standard screws will loosen unless locked or tightened to the breaking point, and by considering the time element which demands that high priced labor and expensive equipment be made as quickly operated as possible and the "make ready" time be unusually short.

The F. Wilson & Son Mfg. Co. had built up a good business for their own plate mounting system, but as it had its limitations, they were like other manufacturers in being constantly on the lookout for a better system or one that would round out their line to make it applicable to all classes of printing. As soon as the armistice was signed they took up the matter of purchasing the patents on two systems that had been developed and offered them during the war.

A mechanical engineer prominent in another field had designed the first system considered. His analytical mind had sized up the weak features of existing products—with outline diagrams, he had shown the salient points of them all and his notes called attention all too loudly to the weaknesses; these had been neatly bound as the first pages of a blue print folio which included complete details of the new system in all its phases and such explanation as are needed to grasp the import of a device both novel and radical. The matter was so presented as to carry conviction—the conclusions were undeniable. Actual signing of necessary papers was held up for a few minutes to arrange some legal detail and during the wait, the prints were sent in to the firm's engineer for the first time, with a request for the date on which production could begin.

Quite naturally the engineer made a hasty review of the processes and tools required for the job. One of the claims in connection with a major part was that it could be turned out very rapidly on automatic screw machines; the engineer weighed this claim against his experience with like parts as they had to be made for other plate mounting systems and his judgment told him that it was a slow automatic job at best and that no automatic would produce that work with the accuracy needed to separate light and shade in printing. As the part and its connections were built around screw machine work, this was a serious drawback.

Then the hook itself with mechanism for making it travel in the slot and tightening on the plate came in for examination. All this was shown to an enlarged scale, but the number of parts put into small space was such that only a person thoroughly familiar with deciphering line drawings could comprehend the construction. The business department of F. Wilson & Son had taken the designing engineer's word for it that

the hook was simple and strong "as per the B. P. enclosed." It was simple, as compared with a watch, and strong, if seldom used and then by careful hands, but it was too light for hurried everyday use by rough hands and too complicated for competitive manufacturing.

For his own assistance, the engineer made some pencil sketches in perspective of these delicate parts and a perspective of the assembly. For the benefit of the "firm," he took these sketches down to the office, along with the conclusions. Suffice it to say that the "business men," in the vernacular, "saw the light," and the deal did not go through. A perspective conveys an idea to anyone not a draftsman, and the sight of hooks as they would appear in cold metal told at once to men familiar with small manufacturing that the scheme was not a financial success, and a general knowledge of the failure of other delicate constructions in the same field warned against another of that kind. In this case, the designer lacked only a knowledge of the actual use of such devices, and in that lack had produced an attractive system; the members of F. Wilson & Son had that knowledge, heartily agreed with the designer's conclusions, and had based their acceptance of the designer's claim for a practical article on his known reputation in another field by their passing over what was to them a closed book.

Another instance occurred in the same office a short time after. This time everything was presented in the form of models, so that it was not considered important to call in the engineer. A novice could see how this plate mounting system worked, a few months' industrial experience would qualify anyone to pass on the parts as rugged, and easy to manufacture. In fact, it looked as if the perfect system had been invented at last, and, like so many perfect things, it was ridiculously simple, and "a wonder nobody ever thought of it before."

One of the Wilson salesmen had seen the system in use in a couple of plants in the West, but had made no inquiries other than to learn that it was very simple and well liked. The inventor openly explained that he had spent all the money he could raise on experiments and the few installations he had made, moreover, as the parts had been made of steel, casehardened, the cost was too high for any sale. His proposition was to make certain parts of cast iron which would so reduce the cost as to make the sale assured. In fact, he had already had bonafide orders for ten thousand dollars' worth if delivery was guaranteed.

Wilson's system used cast iron parts extensively with all success. Also it was very much like the new one except for the mechanical movements employed. It was not hard to agree on a royalty, and the house of Wilson was to assume all responsibility for sales and manufacture. The similarity in sizes and shape prompted the thought that a substantial saving would follow through the use of

existing tools and to verify this the engineer was sent for.

The latter verified the tool situation at once but asked for half an hour's time to make sure. In reality he spent the time in drawing some skeleton diagrams of the movements and in making certain calculations in strength of materials. He reported back on time as follows:

"Gentlemen. I didn't want to consider the tool situation, I wanted to study this movement, which is so simple as to be suspicious. I have found the hitch. In holding a plate, this screw must be tightened, but the screw is so placed that only one-fourth of the power applied is available for plate holding, neglecting friction which must be high; the thrust of the remaining three-fourths is lost, it goes to stress the containing parts. No wonder so large a wrench is required to operate the hook. Considering that a workman applies but ten pounds to the wrench (which is very little) this body is stressed way over to the breaking point of cast iron, and would not stand up a minute. I doubted if the steel sample retained its size, and proved it by micrometering it, which showed a strain of several thousandths at the point of stress. Furthermore, there are two places where abrasion will take place with the cast iron, quickly destroying serviceability; this did not take place with the glass-hard steel surfaces, but their cost is prohibitive."

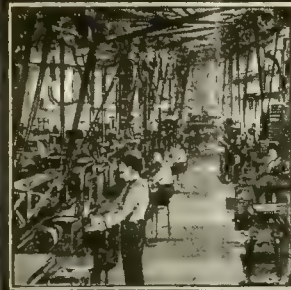
F. Wilson & Son are as shrewd as their competitors and as other business men. Probably now they would admit what they would never have done before, that their engineers are really business men as well as technical professionals. In their unheralded labors of advising men of business, of saving or making money by not spending it, they unconsciously answer the question and place themselves in the class of super-business men.

AN EXTRA TURN

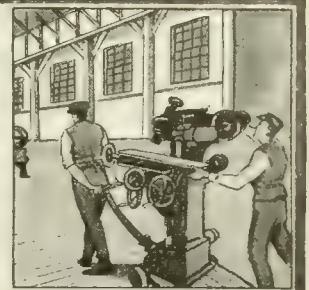
At a rest camp somewhere in France the men of a certain famous Scotch regiment were holding an impromptu concert. Presently there drifted into the tent, lured by the sounds of revelry, a sturdy Cockney motor driver of the A.S.C. For some time he listened appreciatively to the music, then he suggested that he would oblige with a Scottish tune. Advancing to the edge of the platform, the A.S.C. man with the inimitable Cockney accent, sang:

"Scots wha hae on porridge fed,
Scots wha's hair is awful red,
Scots wha suffer frae swelled head—
Gang and wash yer knees!"

He made escape in good time, and so far has not been caught, but a whole regiment of kilties, mad with rage, are still on his trail.



DEVELOPMENTS IN SHOP EQUIPMENT



Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

THE illustrations show bar stock rack arms recently placed on the market by the Kent Machine Co., Kent, Ohio.

The bar stock rack arms for long stock are made in single sectional units, which may be spaced any distance apart to accommodate the length of stock to be held. Each of these units is made up of a number of interlocking sections so that any number of arms and any height of unit may be obtained.

The base of the unit is heavy and projects out beyond the longest arm, thereby giving each unit stability and keeping the centre of gravity of the load within the area of footing. As will be seen from the illustration, the base is provided with a protection in order that it may be used as an arm for holding stock. The weight of this stock also adds to the stability of the unit.

The spacing of the arms may be varied by using the interlocking space collar and large spaces may be obtained for light yet bulky material, such as tubing, etc. All arms and spacing collars interlock with the base and no set screws or holding devices are required in the assembly. The hole in the sectional pieces of the arms is bored to fit the vertical spindle and the interlocking devices are fitted so that there is practically no lost motion.

With the combination of adjustable spacers, these racks may be adapted to any material and enough arms may be placed on the vertical spindle to pro-

vide for a proper classification of the material stored.

The second illustration shows a three arm sectional interlocking unit, complete in itself, for storage of short lengths of stock. The short length in the long bar rack is always annoying, causing considerable difficulty in removing the longer lengths of stock. To avoid this difficulty the short length rack arm has been designed to be used in connection with the longer units.

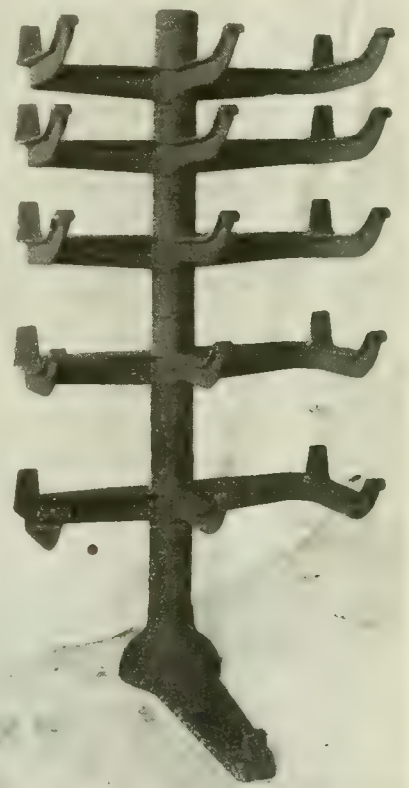
The spacing of the arms of this device may also be varied by the use of interlocking spacing collars, so that any type or size or material is well provided for.

The material of construction is cast iron. The arms have been tested to carry all the material that can be stored on them.

HOB AND FORM CUTTER GRINDING MACHINES

The H. E. Harris Company, of Bridgeport, Conn., have placed on the market what are known as their precision automatic hob and form cutter grinding machines.

These machines have a grinding head, which carries the wheel spindle. This spindle is mounted in ball bearings, and provided with micrometer adjustment, horizontally and vertically. This is accomplished by means of carefully fitted slides, and the micrometer screws are all graduated in .001-in. divisions. The slack of the wheel spindle belt is taken



STOCK RACK FOR SHORT STOCK.

up by an idler, which ensures a smooth running wheel.

The wheel itself is covered with a guard, to which is fed the lubricant by the spout of the forced lubrication system. This guard not only safeguards the wheel, but at the same time it prevents the scattering of dirt, and confines and directs the lubricant to its proper place. The lubricant, after it has once been used, drains from the wheel and the work, directly into the pan surrounding the table. This pan is cast integral with the table, and the lubricant is fed back from this pan into the column. In this way the lubricant is used over and over again.

The work is carried between centres, upon a reciprocating table. The mechanism for controlling the stroke of same is contained underneath this table in the



BAR STOCK RACK FOR LONG STOCK

column of the machine. The table carries the necessary means for setting and holding the work, and also carries the indexing mechanism which directly indicates and clamps the hob or form tool in position for each double grinding stroke.

The operating mechanism for the indexing is contained in the column below the table. This is so timed to co-ordinate with the mechanism for the table movement.

The mechanism operating the table is driven by an independent belt through the means of a worm or worm wheel. The automatic feature can be instantly disconnected if desired, or connected, through the means of a positive clutch operated by a handle at the right of the front of the machine.

The table carries a set-up stop, which when not used drops out of the way. It is by means of this stop that the hobs or form tools can be accurately set up, so that the machine will start grinding the proper amount. The lubricant is contained in a tank in the back portion of the machine column and is easy of access.

All bearings, ways and bearing surfaces are large and ample in surface, and proportionate strength has been provided for throughout the machine. Owing to this rugged design, the resulting ground surfaces are of a high quality and afford cutting edges which will stand up a good deal longer than the rough surfaces as ground by a machine of light design, and fitted with improper wheels.

All wearing surfaces are provided with easily accessible adjustments, so that wear or play can be quickly taken up. Every surface is protected from the action

of abrasive or metal particles, which tend to cause them to deteriorate, and ample provision is also made for the lubrication of these various surfaces.

The machine is also so designed that all back lash between the hob or form cutter and the wheel is taken up automatically, as the machine operates, thus preventing unequal grinding, dragging, or gouging of the wheel into the work. The indexing is done at the end of each double stroke, during a pause in the movement of the table.

All necessary adjustments for changing over from one type of form cutter, or hob, to another, have been carefully worked out with a view towards simplicity, the result is that to change over from one type to another becomes a very easy matter.

The machine will grind any form cutter or hob within its range, including radial mills, fluting cutters, gear cutters, irregular form cutters, hobs for hobbing female thread gauges and threading dies, taps, hobs or cutters for milling threads, hobs for worm wheels, and hobs for gears, expeditiously and accurately. Narrow cutters may be mounted on suitable arbor,

and a number of these can be ground collectively.

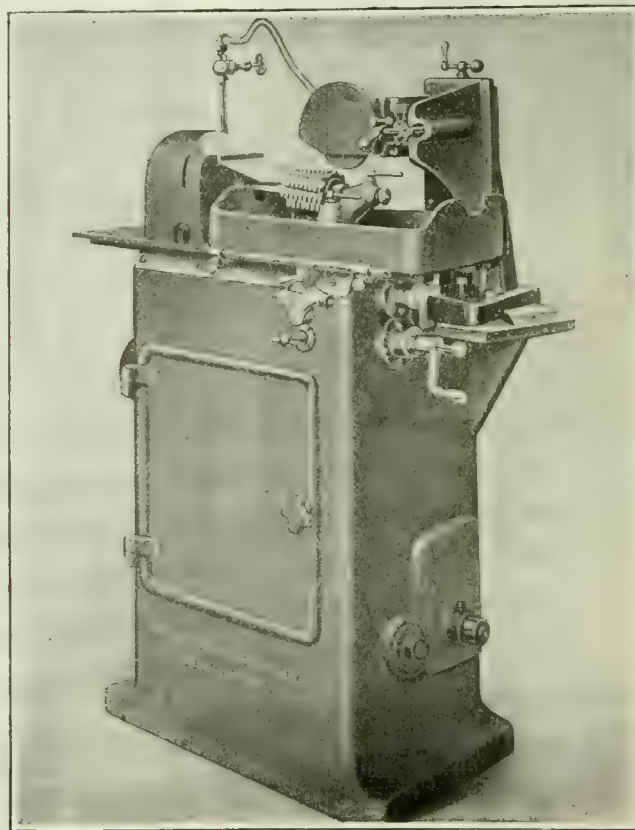
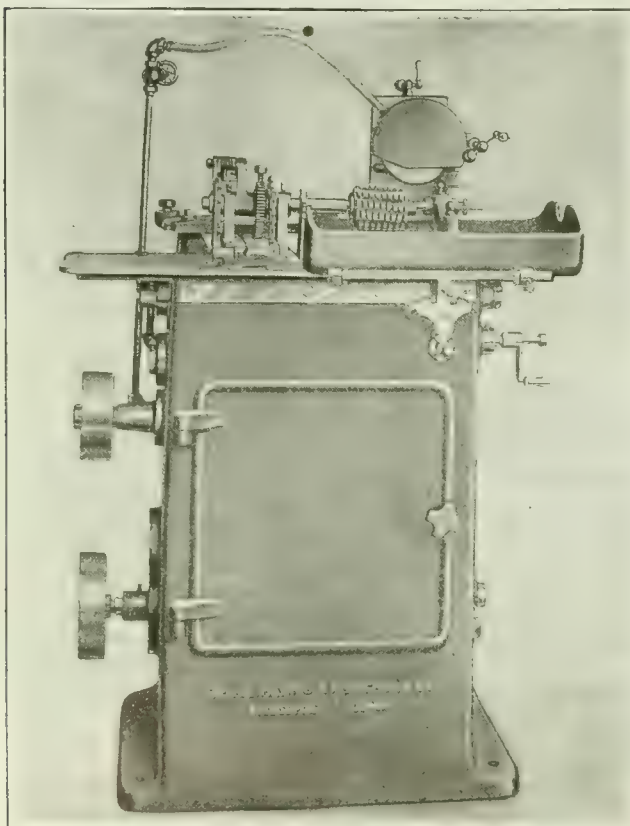
Special Requirements Cared For

As the range of work which this machine will cover is very much diversified, there is a limit to the variety of work that any machine can take. It is customary to submit blueprints, or specifications of the different hobs, or cutters that machine is required to grind, when if necessary the machine will be modified to meet these special requirements.

The machine as described by the builders, is what they term a high-grade precision tool, built to their usual Harris standard of workmanship and material. As they state, this is a new machine developed to meet a great necessity, for at the present only 25 per cent of the rural production is secured by the usual method of grinding. Salvaging milling cutters, by regashing the teeth can be done on this machine to the best advantage. With the automatic index, one operator is enabled to attend to several machines. At all times there is a heavy flow of lubricant flowing on the work which prevents the possibility of burning the work.

General Specifications

	Straight Flutes Mach. No. 1	Universal Mach. No. 2	Straight Flutes Mach. No. 3	Universal Mach. No. 4
Table travel	6"	6"	10"	10"
Diameter of work to be ground ..	6"	6"	8"	8"
Length of work to be ground ..	31½"	31½"	10"	10"
Number of flutes	From 4-up	From 4-up	From 4-up	From 4-up
R.P.M. of wheel spindle	3000	3000	3000	3000
R.P.M. of the table pulley	155	155	320	320
Horizontal adjustment of wheel each side of centre	3½"	3½"	1½"	1½"
Diameter of wheel	6"	6"	6"	6"
Size of hole	¾" hole	¾" hole	¾" hole	¾" hole
Shape of wheel	Saucer	Saucer	Saucer	Saucer
Floor space	29" x 24½"	29" x 24½"	24" x 50"	24" x 50"
Weight	552 lbs.	632 lbs.	882 lbs.	909 lbs.
Weight boxed	621 lbs.	713 lbs.	952 lbs.	979 lbs.



TWO VIEWS OF THE HARRIS PRECISION HOB AND FORM CUTTER GRINDERS.

Do You File Away Technical Information?

Various Methods Are Used, But the Best System Must Depend Largely on the Way in Which Material is Printed — Some Suggestions For Carrying on This Class of Work

AT no previous time in the history of industrial development has such a vast amount of technical literature been placed before the students of engineering trades and professions, plant executives and mechanics, as that of the present progressive age. It has been truly said that, "the trade papers of to-day are the text-books of to-morrow," and in very few instances will it be found that the material appearing in the latest text or reference book is of a virgin character, for the fact, that such hand-books are invariably a compilation of data that has been previously published in mechanical, trade, or other technical periodicals. It will generally be conceded that a great deal of the subject matter of the average technical journal is of transient interest only, but it will likewise be admitted that a large portion of the editorial contents is of considerable and likewise permanent value.

Developments in mechanics and engineering enterprise is progressing so rapidly that, apart from the fundamental or elementary essentials, the contents of a text-book a few years old may be very much out of date. For this reason the practice of preserving current periodical literature is a commendable one, as it enables a person to keep in touch, constantly, with the advancements and improvements that are continually being made in connection with any particular line of work in which the reader is especially interested.

Much has been written and considerably more has been said regarding the various methods that have been adopted, or suggested, for keeping track of material published in this way, so that the same could be readily located when occasion required. Indexing, filing and binding systems, by the score, have been tried out with more or less success, the more efficient necessitating considerable concentration to insure their satisfactory operation. Doubtless, there are quite a number of readers of many magazines that make a practice of retaining certain articles for future reference. This may be done in either one of two ways—keeping on file the entire volume, or cutting out the specific data or material.

The first is a very cumbersome method and requires much space if many periodicals are to be the basis of the records. It, however, provides a very efficient means of reference if the index to the contents are properly arranged in a systematic order and the subjects cross-indexed, so that the material can be readily located from several angles of approach. The latter practice of extracting and keeping articles is probably the method generally resorted to by those accustomed to the preservation of such material. However, it is quite safe to say that the percentage of readers of technical papers who make an attempt to gather this information is relatively small and even those that do are frequently at a loss to locate the desired material when the same is required.

The Best System

The basis of any successful record system is proper filing and indexing, and these two fundamentals must be closely allied to each other. An elaborate file would be practically useless without some reliable means of indicating what the file contained. Uniformity is one of the keynotes of efficiency, and office systems would be of little value if haphazard methods were adopted. Standardization is rapidly being recognized as an essential factor in the economic production of manufactured articles. Years ago nearly everything was made on the fit-and-try method, but to-day the practice is to produce articles, or parts, so that the same will be interchangeable, every similar piece being of the one type and pattern and virtually identical in every minute particular.

From time to time readers of technical or trade papers

are confronted with articles relating to the filing or preservation of material contained therein, and in general the method propounded is of considerable interest and would be of ultimate value if persistently carried out. Invariably, the keystone of many of these suggestive treatises is uniformity. The cards used for indexing, if a card system is adopted, are of one size for convenient reference. The folders or binders that contain the articles referred to in the index, are likewise of a size. The basic factor, therefore, of any successful filing system must be standardization. This standard will no doubt vary according to the ability or the initiative of the party keeping the records, but is there any reasonable argument that it should do so?

Other Considerations

The variation in the methods of preserving technical data, is due, largely, to the character of the material published and the position it occupies in the paper. It will be immediately recognized that it is virtually impossible to publish editorial matter after the same principle used for advertising, where a certain space is devoted to the purpose, but could not some sort of compromise be made whereby the material as published would be more uniform in character? It is not intended that the writer should advocate a radical change in the set-up of the editorial section of technical papers, but it is his belief that the data on certain matters could be rearranged to be of exceedingly more value to the reader who may be interested in that particular subject. In connection with page articles or those of greater length, little material change could be made, as present practice is sufficiently efficient for the requirements of the reader. It is more in relation to those short articles that appear in the section devoted to shop methods, subjects for practical men, methods and devices, etc., with which this article has to deal.

In a great many instances the value of these articles are of such a character that many readers, especially the mechanics in the shops, make it a practice to preserve the text for future reference. In cutting these out, however, it is frequently necessary, owing to the distribution of the material about the page, to destroy what is equally valuable on the adjoining page. It is seldom that any two of such articles occupy the same space; frequently a brief description of a jig or fixture, a solution to a shop problem, or other interesting data, will commence on one page, extend for a column and a half on the next, and yet not occupy a full half page for its entire treatise. Looking in a scrap book, or a folder, of a man that has accumulated considerable data on some subject, what do we generally find? Usually a jumbled mass of papers that are very difficult to sort over when looking for a specific article.

More System Needed

In the opinion of the writer publishers of technical papers could enhance their value by adopting a more systematic method of compilation of those short articles that are of special value or of general interest. Technical papers are published from week to week—with no variation in size. Office records of the publishing house are kept in a systematic and uniform condition. Articles are frequently published outlining some simple or elaborate system of filing material for reference. Yet little attempt is ever made to compile the editorial text on a comprehensive record system. Articles are often placed in the paper in a haphazard manner, irrespective of where they start or finish, and not infrequently to the confusion of the reader. It would seem possible that these articles, that range from a half column to a page, would be more

Continued on Page 267

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The Shortage of Apprentices

THE superintendent of one of the largest printing offices in Toronto remarked a few days ago: "I want compositors, linotype operators and make-up men. We are handicapped because we can't get them. While this is the case we have applications every day in the week for every laborer's job that turns up around the place."

There is something to think about in that. It means that there are not enough skilled men in the printing business. Wages are good, working conditions are satisfactory and approved of by the men's union.

Why are there no apprentices coming along? This same question can be asked in connection with almost any trade that might be mentioned. There is something radically wrong with the young men of to-day. Is it possible that they are willing to slide along and at last be willing to slip into that great class called unskilled labor, whose only means of making a living is selling himself into a market that has a tremendous amount of competition nearly all the time by reason of its overcrowded condition?

Nearly all lines of work have reported a marked tendency for a number of years toward the weeding out of the apprenticeship system. The young men and lads want to get money right away. They do not want to put in their four years at small pay. They do not see the need of training, and apparently they have passed out from the influence of anyone older than themselves who would see this thing for them.

The printing trade, like many another trade, will have to make a move in self-defence if from no higher motive. It must be made certain that sufficient apprentices are entering the lists to have a supply of skilled men later on. The life of a skilled mechanic is interesting, it is full of possibilities, and in the meantime it has reached a stage where a man who is master of his trade can command decent wages and good conditions.

The Italians' Good Move

THE *People's Journal*, Welland, an Italian paper, is to be enlarged and the scope of the business extended. The new plans call for the printing of a page of material in the English language, so that, as the management says, "Canadians may be given an opportunity of acquainting themselves with the viewpoint of Italians in this country."

It looks as though the Italians were taking the step that should have been taken by the English-speaking element of the community long ago. As a matter of fact we have not been mindful as a people of the responsibilities placed upon us by the coming of thousands of these people to our country.

Foreigners are tolerated because they will often do a class of work that we do not fancy doing for ourselves. We are not particular whether they get ahead or not as long as they can be drawn on to do work that no person else will touch.

To be sure, we make laws for them to go by. They don't understand them, but that is not our fault. They are not interested in our views, but that is no particular concern of ours. We make the laws and that is about all we have to do with it. No, there is one other thing that is done. We have officials to go and visit these people every now and then and chase them into the police court, where they are invited to part with some of their money or spend a few days in jail.

But apart from that, have we made a real serious effort to get at these people? Have we made an honest try to Canadianize them? Do we do anything to make them understand that it is to their advantage to become citizens of this country in the real sense of the word?

If the Canadian people want to be quite honest in the matter they will have to acknowledge that their attitude to the Italian or any other foreigner has, for the most part, been that of a party approaching him with a ten-foot pole. It may be that the Italians with their English page will blaze the trail to a better understanding.

War Stories Need Shaking

THE war is surely digging deeply into the minds of the writers of fiction. New plots have been hatched overnight. By noon they have taken on form, while by evening they have wandered into the offices of the publishers.

It is strange, but true, that romance seems to stalk through all the plots that are reared up and clothed for purposes of printing. In years gone by the writer of fiction had few choices. He could have the beautiful daughter of a millionaire bathing. Of course she would go beyond her depth and be rescued by an apprentice in her father's factory. Said apprentice would have to be poor but handsome. The changes have been tuned on this scheme until a magazine editor is ready to fall on the neck of a contributor and weep when he brings in a variation.

But the war has turned the trick. The editor of a well-known Canadian magazine is responsible for the statement that no less than 200 manuscripts have been sent in during the last year, all centred around the same thought. A young man hesitates to go to war. His lady friend hustles off as a nurse and the half-slacker decorates his shoulder with a musket and hustles to the Western front. Of course he's wounded, rushed to a hospital, murmurs and gurgles something about Tilly at home. Then he's nursed to health by said Tilly, who, of course, always happens to be in the very hospital where sick Hector is trucked.

Why can't story-writers change the plot? Surely they could just as well make the head potato-peeler of the regiment elope with the colonel's wife, or have the wife of the corporal doing the ladder act at midnight to leave with the major for parts unknown.

Shippers who are called upon to make much use of the services of existing companies are wondering how the Canadian Railway War Board has the right to make regulations governing traffic now. Recently an order was made that all parcels for express be prepaid. There are shippers who have a load every time the express wagon calls, and it is next to impossible to prepay all parcels, and the work of charging back the transportation costs where sale is made f.o.b. point of shipment is also considered. If there are regulations to be made governing such affairs, they should come from the Dominion Railway Commission and not from the Canadian Railway Board.

Training The Apprentice

THE overnight training of a vast army of laborers for the operation of single-purpose machines admirably met the most unusual conditions demanded by war munitioning, but no one can say that this training of formerly unskilled men has added much to the country's resources in the nature of skilled mechanics. Single-purpose machine operators will have an increasing value in manufacturing economics as the growth of plants making repetition products occur, but the mainstay in our industrial life, as before, will be the skilled mechanic with ability to turn his hand to anything required of him.

To build up the class of skilled mechanics a good apprenticeship system is necessary and the keen interest which this problem is arousing in English-speaking countries to-day will go far in our ability to meet German competition in the economic struggle to come.

The Canadian apprentice during the war hardly existed, but the high wages paid to the skilled mechanic and the loss of the easy income to be gained through repetition work has evidently made apprenticeship more attractive to the average boy, judging from the experiences of several large metal working industries in one of our smaller cities. These firms state that no trouble is encountered in securing the right class of youth for training.

The excellent rates paid the apprentices no doubt has much to do with this condition as the following outline of the method developed will show:

Apprentices are indentured for a four-year period, a definite number of hours' work going to make up each yearly period. The first year apprentice is paid at the rate of 9 cents per hour with a bonus at the end of the year of \$15. The second year apprentice receives 11 cents per hour and a bonus of \$25, the third year apprentice, 14 cents an hour and a \$50 bonus, while the fourth year man gets from 18 to 20 cents an hour and a \$50 bonus. In addition to this final bonus, tools to the value of \$50 are also given. The hourly rates given above are the minimum rate established and a bonus system which affects the apprentice as well as the machinist, increases these rates very materially, the actual rate being about 15½ cents for the first year and 25 cents for the fourth year.

No technical school being available, night classes are run in the local Y.M.C.A., and any time spent at these classes is allowed on the four-year period. The membership fee for the Y.M.C.A. is also paid for by the firm.

Many Firms Making Tractors

ACCORDING to reports that are circulating in machinery circles in New York there are so many concerns going into the manufacture of tractors in United States, that the machine tool concerns are looking very carefully at some of the smaller people before they allow them much liberty in the way of terms of sale. They fear, evidently, that in the rush to turn out a commercially successful tractor they may be left by the side of the road.

The making of tractors is not a side-line. The firm that is going to succeed must go into the business large enough to secure something in the way of quantity production, and it must also go in far enough to establish that service to the buyer that will make it certain that the supply trade will revert to the original maker of the tractor.

There has been a lot of money spent in the way of experiments that will not be recovered. If a firm were alone in the field it might be possible to arrange the selling schedules so that there might be a gradual absorption of the money that was lavished in the periods of investigation and experimenting. As it is now there is little to hinder a firm holding back until some more enterprising concern has gone ahead and done the missionary work, found out what sort of a machine is suitable to

the different countries, and then follow along and make these.

If the makers of tractors in Canada are to succeed they should have a tariff preference of at least 12½ per cent. That is not a high enactment, but it is necessary in order that this country, where a great field for tractors exists, shall have a chance to hold its own market.

DO YOU FILE AWAY TECHNICAL INFORMATION?

Continued from page 265

in keeping with present recognized standards of efficiency, if the text matter were confined to a section the full width of the page—two or three columns wide—and extending to a depth sufficient to meet the requirements of the article. At the extreme upper right hand corner could be printed the subject matter of the article, while the title could be placed in the usual manner, the required cuts or illustrations being inserted where desired. In this way it would be possible for a reader to commence a filing system that could be kept up-to-date without an elaborate system of records.

A Concrete Suggestion

As a basis of calculations let us suppose that the smallest article treated in this way occupies approximately one-third of a page, or a depth of 3¼ inches on a ten-inch page. A filing cabinet with one or more drawers 8 inches wide and 4 inches deep would serve for the preservation of these articles. An articles that would occupy a greater depth than 3¼ inches could be folded to suit the capacity of the cabinet. Where a brief description of a jig or fixture, rule or formula, or other data, occupies less space than the 3¼ inches it might be advisable to couple up two short articles on the same subject, or use fillers pertaining to the subject of the sketch.

It might be argued that the same objection would arise from this method as from that of the one now in use, namely, the cutting into articles on the opposite page that a reader might desire to preserve. This is true, and a point that cannot be entirely overcome, but could be minimized by using discretion in the placing of the material, devoting separate pages to different subjects wherever possible.

In the compilation of long articles it is often necessary to use illustrations and formulæ for instructive purposes. An article might occupy anywhere from one to ten pages and yet the reader might only wish to preserve the essential points. It is often possible to condense such an article into a few brief paragraphs, with a chart, cut or formula, so that a reference to the same will be sufficient to recall the entire article. This could be compiled and inserted after the manner before mentioned.

Regarding articles that occupy only a small portion of a column, it would be difficult to depart from present practice, as little could be gained by spreading the same across the page. A convenient method of keeping these short articles is to select the ones required, cut them out, taking care to preserve the blank margin on the side. Secure a scrap book of ample size and divide into sections for the various subjects. Paste or glue these in, securing only about ¼ inch along the outer margin, or the lower edge; commence at the top of the page and work downwards, overlapping each article so that only the title is exposed. By this means the subject is brought prominently before the reader and anywhere from 5 to 25 pages of reading matter can be placed between two pages of the scrap book, and in such a way that ready reference is a feature.

Apart from the detail last mentioned it might appear that the suggestion here outlined is a radical departure from accepted practice of compiling technical paper data, but it is a move that the writer feels would meet the approval of many readers, and, therefore, is worthy of consideration.



MARKET DEVELOPMENTS



Are Too Many Firms Turning to Tractors

Some of the American Machinery Dealers Are Said to be Rather Suspicious of the Business of the Lesser Makers Who Want to Turn Out Tractors—Scrap Prices Are Down Again

REDUCTIONS are expected in several lines of raw material entering into manufacturing costs, and among these steel is expected to lead the way before long. There is a desire on the part of the mills to get as close as possible to the point where buyers will confidently come into the market, knowing that they are safe in making extensive purchases. The only danger is that the reduction may not be made in such a manner as to preclude the danger of a price-cutting campaign. Were this to start it might be difficult to put a peg in and stop the movement, and prices might easily be flattened to below costs. The general belief is that a new schedule will become operative about the first of April.

Machinery dealers report business as improving. The best of the war shop material has been pretty well sorted over, and when this is done the sale of new machinery will again become more active.

Scrap metal dealers have little to do these days, hence their chief indoor pastime is battering down the prices at which they will consider buying any material. One of the largest yards in the Dominion stated that during last week they did not make a single sale, the first time this has happened in a business experience of over thirty years. The future depends largely on the action of the Governments of United States and Canada in dealing with the large surplus stocks of copper and brass scrap left over from the war work shops. There are, it is believed, some millions of tons of this material in store, and if it is released at once, the market will be hopelessly glutted. Much the same state of affairs can be said to exist in regard to the various forms of steel scrap.

MONTREAL MARKET TAKING SOME TIME TO GET BACK TO OLD LINES

Special to CANADIAN MACHINERY

MONTREAL, March 12. — Industrial conditions are gradually assuming a more settled appearance, but much has yet to be done before general activity will be resumed. The period of readjustment is still in progress, and until the influence of the war is entirely removed there is little prospect of a free return to the ordinary expansion or development. This, however, is sure to come, and when conditions become more settled greater activity is looked for. The metal situation is unchanged and prices are as quoted last week. It has been announced that restrictions have been removed from tin and that it is not now necessary to obtain a license for shipments. This may shortly result in a lower tin price. Adjustment on American shell business is still in progress and plants are awaiting settlement before taking up new business. Operations in old materials are almost suspended, with prices steadily declining.

Domestic Development Deferred

Considerable interest is at present displayed in the possibility of an early revision of steel prices to enable a more general resumption of domestic activity that is, apparently, being deferred for this very reason. Dealers and others here are awaiting developments in the

States to see what the outcome will be from the proposal of the Government that producers co-ordinate in the deflation of war prices. From the enquiries that dealers are receiving it would appear that considerable more business would develop but for the relatively high prices that are still ruling. Manufacturers of steel advance the argument that the adjustment of wages to lower levels will take a long period, and until this is effected it is difficult to see where any radical price reductions can take place. Dealers here are satisfied to carry more warehouse stocks but are not yet anxious to overload themselves in the face of a possible decline. The market is still influenced by uncertainty, and it is safe to say that delayed development is due to this cause. Until the atmosphere of war work adjustment is cleared away domestic enterprise will be more or less retarded. Declines in price quotations are anticipated here but at present prices ruling are the same as last week.

Settlements Awaited

Prices on machine tools are still comparatively high, but this factor apparently has little bearing on present sales. Purchasers of equipment will pay the

price if they desire the tool, but unless the requirements demand it the acquisition of new equipment is carefully avoided. Existing conditions are not conducive to unnecessary expansion or replacement of machinery, and invariably the manufacturer is making the best of what tools he has or securing equipment that has seen light service. Dealers here have been doing a fair volume of business in buying up, repairing and rebuilding used machines for disposal at reasonable figures. In a great many cases standard equipment that has seen service in munition work is capable of being converted over for general purpose work by replacement of some of the parts, and a general overhaul and realignment. General supply demand is light in comparison to past reports, but under existing conditions is considered of fair volume. A factor that has some bearing on machine tool activity is the delay that is taking place in the adjustment of American shell and plant contracts. This has the tendency to keep many tools from being released for further disposal. Several plants in this district are still negotiating with the U. S. authorities for settlement.

Shell Machines for Scrap

The scrap situation offers little upon which to comment owing to continued activity and the reluctance of the dealers to show any great interest in existing conditions. Some of the local dealers

have been doing a fair business in second-hand equipment, buying shell machinery in bulk and disposing of it at a fair profit. Little can be done with special machinery other than to dismantle it and separate the various metals, thus providing a more profitable basis of selling the materials. Prices are still showing a weaker tendency, but little actual business is reported. This week's quotations are unchanged but must be considered as nominal.

BATTERING DOWN THE SCRAP PRICES

That is Becoming the Popular Pastime
With Most of the Dealers Now

TORONTO.—Business moves along well in machinery lines. Larger orders are not numerous, but there is a good volume of selling going on in a general way. Dealers are quite emphatic in their statements that the outlook is much brighter than they had been courageous enough to believe at the close of the war. It is believed that with some price adjustments which will give manufacturers a little more confidence in the future levels, buying will become much more general.

Nothing Else to Do

Battering down the price list is coming to be the chief indoor pastime of the scrap metal dealers. One of the largest of these dealers stated to this paper to-day: "The only thing we can do for you to-day is announce another downward revision of the price lists. We were hoping a few days ago that we were really scraping on the bottom of the price scale, but it has not come to that yet." For the first time in thirty years," he went on, "we have gone for an entire week without making the sale of an ounce of material. That is a record that we do not want to stand very long. It is hard to believe that prices can go on down to a lower level than they are at present. A great deal rests, as far as red and yellow metals are concerned, on what the United States and Dominion Governments intend to do with the scrap metal they have in their hands at present. There are millions of tons of this material, and the manner in which it is going to be disposed of will make a great deal of difference as to the future of the scrap metal markets. If the policy adopted is simply to throw this material on the market, why it means that the situation will be glutted, and prices may stop hardly short of nothing at all. If, on the other hand, they decide to control the release of this scrap, and allow it to come out in quantities that can be readily absorbed in the trade, then matters may be much better, and a gradual recovery would be looked for by the trade. Much the same condition prevails in the other lines of machine shop scrap, and the Government can do much one way or the other to stabilize the market for this material. Until these points are decided it is hard to see how there can be anything ap-

POINTS IN WEEK'S MARKETING NOTES

At a very largely attended meeting of the steel industry held in New York last week, the prices of steel were thoroughly canvassed, and it seems to be the opinion that reductions are about due in a good many lines.

Warehouse men are sincerely hoping that price talk will cease soon. They point out that the present uncertainty is doing more than anything else to keep the buyers out of the market in a large way.

The Ford people, it is reported, are coming into the market with a car that will sell around the \$300 mark in the United States. It is thought this is being done because a number of other firms are bringing out cars to compete with the Ford at the present selling price.

Garages in this country are buying considerable war-shop material. They claim it suits their purpose and is cheaper than new material. The work of rebuilding this class of machinery, much of which had been stripped, is keeping several shops engaged at present.

Scrap metal dealers have brought down the prices again at which they will consider buying. It was thought some time ago that the bottom of the price list had been reached, but no one can state that even the present lowly figures are the final word in downward tendencies.

The New York machine tool market is showing considerable improvement, and many of the shops are reported as operating full time with some extra shifts being used as well.

Reports have it that a price of 2.90 was quoted on a plate order in Toronto district. The chances are that this is a forerunner of a lower level.

So many firms are starting to make tractors in the United States that dealers in machine tools are looking askance at the business of some of the lesser concerns.

Copper and brass scrap is a drug on the market. For the future much depends on what the United States and Dominion Governments intend to do with the large volumes of scrap material they have on hand. If everything is released at once the bottom will drop out of the market.

proaching a betterment in the conditions of trade.

Dealers brought down the prices on all grades of coppers again this week, crucible, heavy and wire now being placed where dealers offer only 12½c per pound for them. Brass cuttings and turnings, both red and yellow, are also down considerably. Perhaps the most noteworthy drop is in heavy melting steel, which sank to-day to the low quotation for Toronto yards of \$9 per ton, while boiler plate comes down to \$8. There is certainly nothing in any of these quotations to tempt holders disposing of their material, and dealers claim they do not want to take on anything for fear of still lower levels.

Shaving Steel Figures

As far as CANADIAN MACHINERY knows, no responsible agency made 2.90 a standing price for steel plate. At the same time it is known that this price has been offered on a rather large scale. The base price quoted by the Corporation is 3c, but this has been trimmed. In fact one manufacturer made the statement to a warehouse man a few days ago that he was taking on all sorts of plate now at 2.75. Upon this statement coming out the manufacturer was promptly informed that he had been elected as a member in good standing of the Ananias Club. When it is found that the practice of price shaving becomes general it can be taken for granted that there will be quick action on the price of the larger interests. It is known that some of the smaller independents have men going through Ontario trying to land occasional plate orders to keep the mills going. If there is anything approaching a decent tonnage they are inclined to cut rather close in order to land the business.

This is not good for the warehouse business. One firm, speaking to CANADIAN MACHINERY said: "It would be a great relief to the trade were there some definite move made in regard to these price matters. At present we have all sorts of rumors and nothing else. The trade is coming to the point where they are feeling that prices are going to be cut, and they are making up their minds that they are not going to be caught loaded up when such a thing happens. It simply means they are buying as little as possible and are not branching out. There should be some effort made as soon as possible to get a definite announcement made on the question."

Dealers do not relish a campaign of hit-and-miss price cutting. If the thing got well under way it might be rather hard to reach over and put enough sand on the skids to stop the operation. There can be no doubt that the trade looks for a downward reduction in prices, and they expect that it will be done very soon.

Machine Tool Trade

A large number of the garages in the country are taking over some of the best of the war shop equipment, provided, of course, that it is of the general purpose type and suitable for the repair work

they want to do. There is not a very great deal of this material that is useful or good. In some cases the machinery was stripped of much of the equipment before firms let go. Rebuilding has been proceeding at several points and a good deal of shell shop outfit is being rebuilt and put in shape.

The railroad shops are again in the market for more equipment. Officials of plants that have announced that they are prepared to go in for new lines have not stated what they are buying. In fact they are not quite certain, and in several cases will buy as they find their

requirements calling for certain production.

The work of making adjustments following the cancellation of war contracts is getting off to a good start now, and Congress having passed an appropriation recognizing all these contracts as legal, it is expected that rapid progress will now be made in getting the adjustments made. The board for this work is sitting in Toronto. The Russell Motor Car Co. have just completed the work of making up their claims. They are for three separate contracts, the shell, fuse and adapter.

HENRY FORD TO HEAD THE RACE WITH A STILL CHEAPER MACHINE

Special to CANADIAN MACHINERY

NEW YORK, March 12.—Business in machine tools and allied equipment in the United States is developing along sound lines, and the volume of orders being placed is beyond what was expected by the machine-tool builders two months ago. The automobile and tractor manufacturing industries are the most active purchasers of new equipment, and a good deal of their buying is being done in Detroit and Cleveland. So many new tractor manufacturing concerns have sprung up that the machinery trade is watching some of the smaller makers with care. Nearly all of the principal makers of automobiles are planning to build more cars this year than ever in their history. The market for small, low-priced cars is believed to be the best, and in this connection the announcement by Henry Ford that will turn out a car to sell at \$250 or \$300 has been noted with interest by the machinery trade, particularly as at least two well known companies, the Willys-Overland Company and the Chevrolet Motor Co. (a branch of the General Motors Corporation) will this year bring out low-priced automobiles which will compete with the Ford car.

A Great Car Output

The Ford Automobile Company and the General Motors Corporation, as has been noted in previous reports, have bought more new equipment during recent weeks than any other interests. Both of these concerns are buying for the manufacture of tractors as well as for automobiles. The tractor plant of Henry Ford & Son, Dearborn, Mich., though separate from the Ford motor plant, is controlled by Henry Ford and his son Edsell, while the General Motors Corporation has taken over a plant at Janesville, Wis., for which equipment has been bought for making farm tractors. The Hudson Motor Car Co., Detroit, will utilize the plant built during the war for making shells to turn out the new Essex automobile, of which about 20,000 will be manufactured this year. The Board of Directors of the Hudson Company has authorized the expenditure of \$1,000,000 for new machinery for this plant and

the Hudson factory. The Nash Motors Company, Racine, Wis., has acquired an acreage adjoining its present factory for expansions, and will need new equipment.

There is quite a bit of activity in the Chicago market. The International Harvester Company is buying equipment for a plant at Croix, France. The Allis Chalmers Co., Milwaukee, Wis., will buy equipment for a tractor plant. The Crane Co., Chicago, will equip a plant in Canada and the necessary machinery will be bought in Chicago or in Canada.

About Export Business

Export inquiries are multiplying, but the first business of importance to be closed was last week, when the French High Commission placed several orders on a list of about 100 to 150 machines which it will purchase for reconstruction work in France. The announcement of the Industrial Board of the Department of Commerce, Washington, that a cablegram had been received from Bernard M. Baruch, former chairman of the War Industries Board, who is attending the Peace Conference in Paris, that the French Government will permit French merchants to import up to \$40,000,000 worth of American machine tools, if a year's credit is arranged, has created a decidedly more hopeful feeling in the American machine tool trade.

Some Shops Are Busy

Some of the leading machine-tool concerns are really quite busy. A few of them are working night shifts. They have a comfortable backlog of orders carried over from the war period, and have, during the last two months, received a sufficient volume of additional business to keep their plants working at a normal rate of production.

The Navy Department is continuing the expansion begun during the war without any marked let-down. One of its new projects is a torpedo station at Alexandria, Va., for which machine tool equipment has been bought, and another is an armor plate plant at Charleston, W. Va., for which a list of 20 cranes, some of them of 100 to 250-tons capacity, has

been issued at Washington. The Navy Department has new work under way at nearly all of the navy yards and equipment is being purchased.

The railroads have been buying almost nothing in the way of new shop equipment, therefore an inquiry from the New York Central Railroad for about a dozen tools was of unusual interest.

Disposing of Material

The Bureau of Aircraft Production, Washington, has announced plans for the disposal of a large quantity of surplus material, including machine tools and fixtures, electrical machinery and other shop equipment, metals, etc. Bulletins will be used from time to time containing full descriptions of the material for sale. Information may be obtained from the Bureau of Aircraft Production, Material Disposal Section, Washington.


The War Department is making rather slow progress in its disposition of surplus materials. The inventories of machinery have not been completed. Sales of equipment are being made in some instances to the companies in whose plants it was installed for war work. An airplane company purchased the complete equipment at the full original cost, and in another case 87½ per cent. of the original purchase price was realized by the Government. The division of military railroads of the War Department is negotiating with the French Government for the sale of \$65,000,000 worth of railroad equipment ordered for the American Expeditionary Forces in France. This includes locomotive and car shops, locomotives, cars, rails, etc. The Emergency Fleet Corporation has also been negotiating with the French Government for the sale of shipbuilding machinery.

The Versena Iron Works, Buenos Aires, Argentina, whose representative has been in the United States for about two months, has bought about \$500,000 worth of machinery, including rolling mills, rivet-making machines, electric magnets, etc.

THINK RY. FARES GOING UP TOO HIGH


Must Justify Increase Before They Can Go Ahead and Collect It

Sir Henry Drayton, chairman of the Dominion Board of Railway Commissioners, has advised the traffic department of the Toronto Board of Trade that they will require of the railways a justification of the increase in passenger rates, against which the Board of Trade have protested. On February 1 the railways revised their method of computing return fares. Prior to February the system was to total two single fares and deduct one-sixth for a return rate, but under the present system only one-tenth is deducted, which, according to the Board of Trade figures, gives the railways an annual increase of \$3,000,000.



THE A.R. WILLIAMS MACHINERY CO. LTD.

64 FRONT ST. W. TORONTO, ONT.



SALES

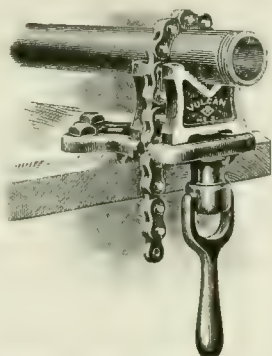
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Concentrated Buying an Ultimate Gain

Firms and buyers that concentrate their buying unquestionably save time and money, in obtaining greater dispatch and service receiving collective shipments, and eliminate much unnecessary office work. Thus, proving in the long run the wisdom of adopting this policy.

With one of the finest assorted supply stocks in Canada, prices equally in line, we can prove the wisdom of concentration.



CHAIN PIPE VISES

Steam Fitters and Power House Supplies

Such as Stocks and Dies of the following makes: Armstrong, Butterfield Solid, Oster, Buckeye, Jardine and Toledo. Also Stillson and Trimo Pipe Wrenches, J. H. Williams Chain Tongs and Chain Pipe Vises, Pipe Cutters in all well known makes, Torches, Fire Pots and Ladles, etc.

VALVES, PIPES AND PIPE FITTINGS

HINGE PIPE
VISES

Our line of valves is quite complete, both in Brass and Iron Body, comprising Jenkins and Penberthy Disc and Regrinding Valves. We can also quote you attractively on pipe and pipe fittings and all steam specialties, such as Anderson Steam Traps, Back Pressure and Reducing Valves, Lubricators, Injectors, Boiler Mountings, etc.

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WRITE FOR OUR SUPPLY CATALOGUE

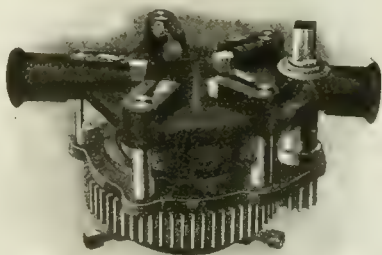
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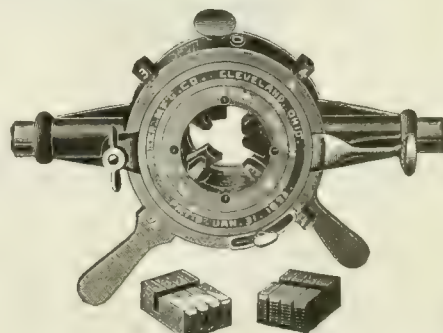
Halifax



"TOLEDO" STOCKS



TORCHES



"OSTER" STOCKS

BIG STEEL OUTPUT, BUT PRICES ARE DUE TO TAKE A DROP SOON

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Mar. 13.—One of the most important events in the year's iron and steel market history occurred last Thursday, in New York, when at a meeting of 130 representatives of the industry it was unanimously decided to co-operate with the Government in its efforts to bring about lower prices for all commodities, particularly building material, in order to bring about industrial activity and facilitate the transition from war time to peace time conditions.

High Operating Rate

The steel industry did not need to reduce its prices at once for the sake of inducing a higher operating rate, for as a matter of fact its operations have been at a high rate. This is a fact that has not been generally apprehended. Apparently the majority of those who have commented upon iron and steel trade conditions have depended upon theory and not upon observation of the pertinent facts. They have observed an extremely dull, even a stagnant, market for steel products and hence have concluded that necessarily the steel mills have been operating at a very low rate, but that is not true. Undoubtedly the real fact is very difficult, if not impossible, of explanation, but that is no good reason for ignoring it. During February there were many trade reports published suggesting that the steel industry was operating at about 60 per cent. of capacity, or even less. Trade reports that sought actual facts, even if the facts did not seem to accord with observed market conditions, contended that the mills were operating at not less than 75 per cent. of capacity. Those who wrote such facts knew that in a short time the official figures, absolutely incontrovertible, would prove that they were correct. This proof has now come. The American Iron and Steel Institute's monthly report of steel ingot production is now out, covering the month of February. It shows that 29 companies, which in 1917 made 85.1 per cent. of the country's total steel ingot production, produced 2,688,011 gross tons of ingots in the month. Allowing for the number of working days in the month and year, and for the output of companies not reporting, this shows a rate of production during February of 40,930,000 tons a year. Capacity is known to be about 49,000,000 tons, so that in February the mills operated at nearly 84 per cent. of capacity. The January report showed a rate of 85 per cent. The highest rate ever attained was 95 per cent., last September. The largest production in a calendar year was 43,619,200 tons, in 1917. The highest production before the war was 30,284,682 tons, in 1912, while the highest rate of production attained, for only a short time, was about 35,000,000 tons, in the spring of 1913.

These figures, of course, are absolutely trustworthy. They show that in February

steel production in the United States was more than 15 per cent. in excess of the highest rate attained before the war. With business throughout the country so very dull, with only a few exceptions, it is impossible to explain this showing, but the fact is there just the same. Possibly the ordinary every-day needs of the country have so grown that they absorb much more steel than formerly, without making a showing of there being much demand. Then there is a good bit of Government work still in progress, while furthermore a little steel, but not a great deal, is going into stocks of producers. The last named item, however, can account for only a few per cent. of the current output, certainly not 10 per cent.

Thus the steel industry has not been in bad shape by any means, but undoubtedly it would get in bad shape in the near future, within a period of a few weeks perhaps, if something did not occur to stimulate demand.

Lower Prices Coming

While various pig iron and steel producers have made some show of not being favorable to Secretary Redfield's proposal that lower prices be arranged there is no doubt whatever that they have been greatly in favor of the project, if it could be carried through in an equitable manner. The producers knew that lower prices would be desirable, in the long run, but they have no means of regulating a decline and if they failed to adhere to regular quotations, slightly reduced as they were last December from the Government limits, there might be a wide open market with prices below cost of production and an absolute destruction of confidence on the part of buyers. Hence moderate reduction under official sanction, to prices openly stated and capable therefore of being adhered to, would prove a great benefit.

At last Thursday's meeting a committee was appointed, its personnel representing all branches of the trade, Lake Superior iron ore, pig iron, unfinished steel and finished steel products. This committee will confer with Secretary Redfield's board, which is called the Industrial Board of the Department of Commerce. George N. Peek is chairman of this board, and the producers find that he is a business man with broad judgment. Mr. Peek gives assurance that the steel industry will not, to employ popular parlance, be made "a goat" but that reductions will be sought on all building materials. The steel producers recognize that their customers buy other things than steel, and if the other things do not come down buying and construction work in general will not be materially stimulated, even if steel prices do come down, hence they want all prices to come down.

The matter of wages will probably be involved. The Government is opposed to scale.

the iron and steel producers will probably propose such reductions that obviously wages ought to come down a trifle in keeping. The American Federation of Labor was offered representation on Mr. Peek's committee, but refused.

The negotiations will probably occupy considerable time, and it may be close to April 1 before the reduced prices are announced and put into effect. A rough guess would be that prices will not be higher than as follows: Pig iron, \$25; billets, \$35; merchant steel bars, 2.00c; black sheets, 4.20c; nails, \$3.00.

While in the main the steel producers are disposed to adhere strictly to recognized market prices until there is an orderly readjustment, some of the merchant furnaces have been weakening, in recognition of the fact that buyers will not take hold at present prices, and some markets are now quotably lower. The southern furnaces, which had a \$34, Birmingham, Government price, were rather slow to make the \$3 reduction recommended in December, and which the northern furnaces adopted January 1, but they did come down to \$31 eventually. In the past week the deadlock was broken by a sale of 500 tons for March delivery to the Standard Sanitary Company at Louisville, Ky., at \$28.25, Birmingham, but this price is not low enough to be competitive with northern iron in general. Before the war Birmingham prices were \$3 to \$4 a ton below prices at northern furnaces. At least two Eastern Pennsylvania furnaces have started quoting on the basis of f.o.b. furnace, instead of f.o.b. Pittsburgh, as the Government regulations effective October 1, 1918, permitted them to do. This makes a reduction of perhaps a couple dollars a ton. Finally, two or three of the valley furnaces have broken loose on foundry iron and have quoted \$28 or less at furnace, against the recognized quotation of \$31.

CANADIAN PRICE IS NOW NEARER BRITISH

There is hope for the Canadian ship-building industry. The Government is in possession of information establishing the fact that at present there is not such a wide disparity between the cost of building steel ships in Canada and in the Old Country.

On the relative basis which applied during the war, a ship built in Canada cost about double what ships were turned out for by the Ministry of Shipping. This fact caused the Canadian Government to slow down on its building activities and to seriously consider the abandonment of the whole scheme.

In recent weeks, however, the situation has changed on the other side by reason of labor troubles. A much higher rate of wages being paid causes production costs to increase. The difference between what a ship can be built for here and there is relatively small, and this is likely to cause the Government to go ahead with the programme, even if it be on a modified the making of any wage reductions, but

45,000 SHOWERS

A Manufacturer Gives the Details of Filling a U. S. Government Order for 45,000 Shower Heads, Using Geometric Die Head and Collapsing Taps.

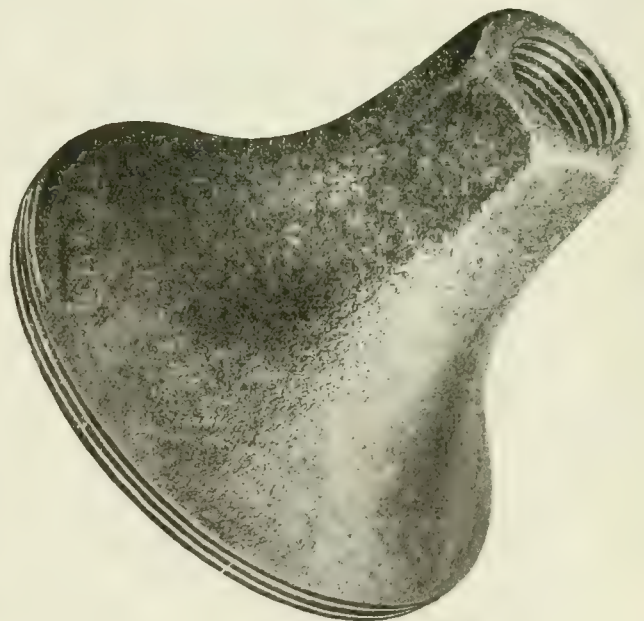
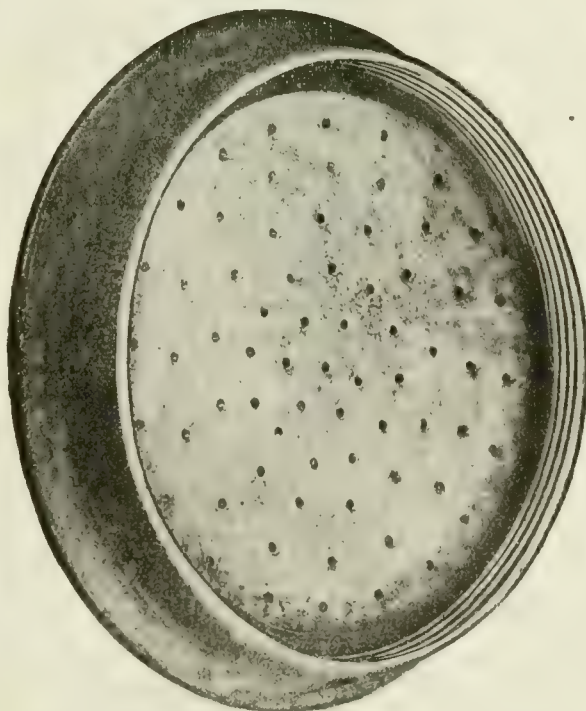
"On the main thread of the shank $3\frac{3}{8}$ "-16, we average 230 per hour, with a surface speed of about 400 feet per minute. On the pig iron end we averaged 220 per hour, with a surface speed of about 200 feet per minute. This speed may seem a little low, but we cut this down in order to get a quicker handling of the work. We handled these in air chuck, and in releasing air chuck the

work automatically dropped to a box below.

"On the face, tapped $3\frac{3}{8}$ "-16, we averaged 210 per hour, with a surface speed of about 400 feet per minute.

"We were very much pleased with the Geometric tools on this work, especially with the chasers, as we completed 30,000 showers, male thread, with one set of these chasers."

Try a Geometric Thread-Cutting Die Head or Collapsing Tap on your work, and be equally pleased.



The Geometric Tool Company

New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal; The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	\$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton		
Victoria		

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	\$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	6 00
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 75
Chequered floor plate, 3-16 in.	9 25
Chequered floor plate, 1/4 in.	9 00
Staybolt iron	9 00
Bessemer rails, heavy, at mill.	
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30
F.O.B., Toronto Warehouse	
Steel bars	4 75
Small shapes	5 00
F.O.B. Chicago Warehouse	
Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

	Per 100 lbs.	C.L.	L.C.L.
Pittsburgh to Following Points			
Montreal	29	39 1/2	
St. John, N.B.	47 1/2	63	
Halifax	49	64 1/2	
Toronto	23 1/2	27 1/2	
Guelph	23 1/2	27 1/2	
London	23 1/2	27 1/2	
Windsor	23 1/2	27 1/2	
Winnipeg	81	106 1/2	

METALS

Lake copper	\$21 00	\$ 22 00
Electro copper	20 00	22 00
Castings, copper	20 00	20 00
Tin	58 00	62 00
Spelter	9 25	8 50
Lead	7 50	6 50
Antimony	8 50	8 50
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, 1/4 up	\$ 5 50	\$ 5 50
Plates, 3-16 in.	5 75	5 75

Price List No. 38

Standard Butt weld

	Per 100 feet	
1/8 in.	\$ 6 00	\$ 8 00
1/4 in.	4 68	6 81
3/8 in.	4 68	6 81
1/2 in.	6 21	7 78
3/4 in.	7 82	9 95
1 in.	11 56	14 71
1 1/4 in.	15 64	19 90
1 1/2 in.	18 70	23 76
2 in.	25 16	32 01
2 1/2 in.	40 37	51 19
3 in.	52 79	66 94

3 1/2 in.	67 16	84 18
4 in.	79 57	99 74
Standard Lap weld		
2 in.	38 81	35 34
2 1/2 in.	42 12	52 36
3 in.	55 08	68 47
3 1/2 in.	69 00	86 94
4 in.	81 75	103 00
4 1/2 in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8 in.	1 93	2 44
8 1/2 in.	2 22	2 81
9 in.	2 66	3 36
10 in.	2 46	3 12
10 1/2 in.	3 17	4 02

Terms 2% 30 days, approved credit.
Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4 1/2" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4 1/2" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds	Per Ton
Montreal		
Copper, light	\$10 50	\$10 00
Copper, crucible	13 00	12 75
Copper, heavy	13 00	15 00
Copper wire	13 00	15 00
No. 1 machine composition	10 00	12 00
New brass cuttings	8 00	9 00
Red brass turnings	8 00	8 50
Yellow brass turnings	6 00	6 00
Light brass	5 00	5 00
Medium brass	8 00	6 00
Scrap zinc	4 00	5 00
Heavy lead	3-4	4 00
Tea lead	2-3	3 00
Aluminum	15 00	12 00
Heavy melting steel	10 00	9 00
Shell turnings	6 00	6 00
Boiler plate	12 00	8 00
Axles (wrought iron)	20 00	15 00
Rails	15 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	18 00	14 00
Pipe wrought	9 00	5 00
Car wheels	20-22	18 00
Steel axles	22 00	20 00
Mach. shop turnings	6 00	5 00
Stove plate	14 00	10 00
Cast boring	8 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, 3/8" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, 3/8" and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27 1/2
Machine screws, o. and fl. hd., steel	10

Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fl. hd., brass	add 25
Nuts, square blank	add \$1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base 3/4" and larger	\$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72 1/2
Wood screws, O. & R., bright	67 1/2
Wood screws, flat, brass	37 1/2
Wood screws, O. & R., brass	32 1/2
Wood screws, flat, bronze	27 1/2
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1 1/2 in.	20
Fin. and Semi-fin. nuts over 1 1/2 in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts	net
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1 1/2 in.	add \$4 50
Cold pressed nuts over 1 1/2 in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	\$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	\$5 50	\$ 5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, 3/4 in. and larger		\$7 50
Spikes, 1/4 and 5-16 in.		8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, 1/4-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net
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Advertising and the Salesman

By A. R. Maujer

Continued from page 2

Hence, behind a majority of stoker sales there exists a *predisposition* on the part of the purchaser to want to find it possible to buy a stoker of a given make. This predisposition is usually full grown long before the salesman makes his first call and often before a catalog or proposal reaches the scene of action. In other words, and as a stoker salesman friend of mine put it, people buy the things they know the most about.

Predisposition is developed in the following ways:

1. Personal experience.
2. Advice of friends.
3. What the man has read.

(1) Personal experience: If a man has used Jones Stokers before, has found them to fill the bill and his dealings with the company have been pleasant he is much inclined to want to find it possible to buy of the Underfeed Stoker Company of America again when he has more boilers to equip. His direct knowledge of Jones equipment predisposes him toward it and his lack of knowledge of others predisposes him against them.

(2) Advice of friends: Think how important one considers the advice of friends whom he admires and in whom he believes! Then, you will remember how much a good word by a mutual friend helps in predisposing a man. It matters not that the friend may have gained his own predisposition by hearsay or by reading. The predisposition is fostered just the same.

(3) What the prospect has read: When a man comes into the market for stokers he is very likely indeed to read up on the subject as extensively as possible. He'll read editorial matter, circulars, catalogs, advertisements—practically everything he can get his hands on.

In the absence of the other two, this is the only factor causing predisposition. In the presence of the other two factors it has its influence just the same.

In the case of a man predisposed against you, strong advertising tends to weaken his predisposition and makes your chance of selling him thereby greater.

In the case of a man predisposed toward you, the advertising naturally strengthens the predisposition.

And it has the same effect upon the friends with whom he may consult.

Advertising, as represented by purchased space in a magazine, is the cheapest form of providing something for a man to read and having it available to him when he wants to read it.

Advertising has still another valuable usefulness:

It helps make the stokers stay sold.

If a Jones Stoker user is constantly seeing favorable advertisements on the Jones Stoker, he is inclined to experience continued satisfaction that

he bought a *good* machine. He's a little pleased with himself that he bought (what he comes to consider) a widely and favorably known machine—i.e., a well advertised machine.

But suppose he has had some little difficulty with his Jones installation. Isn't he more inclined to feel that the trouble may have been due to poor operation rather than to inherent faults in the machines themselves, if he is constantly seeing advertisements portraying the successes attained by other Jones installations?

Surely, he would be quicker to doubt if he saw few or no Jones Stoker messages and numerous convincing-sounding I. X. L. ads. He'd soon come to think: "I always knew I'd made a mistake by putting in these Jones machines."

Then, advertising can not only help to sell stokers but it can also help to keep them sold, by maintaining the confidence of the users.

In this day and age a house seems to be judged, in the absence of other positive evidence, by the advertising it does. Hence, the keenest minds in every line of endeavor are taking care that their advertising grows in proportion to or slightly more rapidly than the growth of their business, in order that that growth shall not only continue but accelerate.

Advertising has repeatedly been characterized as business insurance. If one has a million-dollar property, he carries a bigger insurance policy than he would if he had only a \$100,000 investment. Then, if advertising is business insurance, the larger the business grows the more of it must be used, so that ultimately that business shall come to dominate in its field—if it possesses the goods.

I do not claim, and no honest advertising man claims, that you cannot succeed without advertising. No one would assert that you could not get from here to New York without the railroads, for you could, eventually. But, just as the railroads are large scale producers of rapid transportation, so is wisely planned advertising a large scale producer of rapid sales.

In a measure, time and money are interchangeable. If you had lots of spare time you could walk to New York. But if you had, or wanted, to get there quickly, you could exchange some money for some time saved and ride on the "Twentieth Century Limited."

Similarly, by exchanging some money for some correctly planned advertising, you can build up in a few years a volume of sales that, without the acceleration of advertising, might require a generation or more.

To my notion, there are just two elements to modern business success: The Goods and the Guts.

The Goods, that you *must* deliver if you intend, and hope, to stay in business and

The Guts to stand up in class and talk right out loud about them.

MISCELLANEOUS

Solder, strictly	0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll ...	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls. ...	1 70
Linseed oil, boiled, single bbls. ...	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sizes up to 52	Per Cent. 35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto	

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15½c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28..	\$ 7 00	\$ 6 50
Sheets, black, No. 10..	6 50	6 00
Canada plates, dull, 52 sheets	8 50	8 00
Can. plates, all bright	8 50	9 00
Apollo brand, 10¼ oz. galvanized		
Queen's Head, 28 B.W.G.		
Fleur-de-Lis, 28 B.W.G.		
Gorbal's Best, No. 28		
Colborne Crown, No. 28		
Premier, No. 28 U.S.	8 20	
Premier, 10¼ oz.	8 50	
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., \$14.35; 5-16 in., \$13.85; ¾ in., \$13.50; 7-16 in., \$12.90; ½ in., \$13.20;

\$13.00; ¾ in., \$12.90; 1 inch, \$12.65; Extra for B.B. Chain, \$1.20; Extra for B.B.B. Chain, \$1.80.

ELECTRIC WELD COIL CHAIN B.B.

¾ in., \$13.00; 3-16 in., \$12.50; ¼ in., \$11.75; 5-16 in., \$11.40; ½ in., \$11.00; 7-16 in., \$10.60; ½ in., \$10.40; ¾ in., \$10.00; ¾ in., \$9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	\$28 00	\$
1¼ in.	32 00	.....
1½ in.	35 00	28 00
1¾ in.	35 00	28 00
2 in.	40 00	28 00
2¼ in.	43 00	30 00
2½ in.	45 00	35 00
3 in.	52 00	40 00
3¼ in. ....	.....	47 00
3½ in.	62 00	48 00
4 in.	70 00	60 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb. 0	06
Lard oil, per gal.	\$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30¢
Standard	30.10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	\$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive .....	.08½
Grits, 80 and finer .....	.06

BRASS

Brass rods, base ½ in. to 1 in. rod	0 38
Brass sheets, 24 gauge and heavier, base	0 43

Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

White	Cts. per lb.
XXX Extra	19½
Peerless	19
Grand	18
Superior	18
X L C R	17

Colored.

Lion	15
Standard	13½
No. 1	13½
Popular	12
Keen	10½

Wool Packing.

Arrow	25
Axle	20
Anvil	15
Anchor	11

Washed Wipers.

Select White	11
Mixed colored	10
Dark colored	09

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard	10%
Best grades	15%

ANODES.

Nickel .....	.58 to .65
Copper .....	.38 to .45
Tin .....	.70 to .70
Zinc .....	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10 ..		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers, in sheets, 6x4 base	45 00	44 00

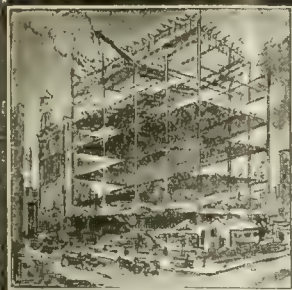
LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	\$13 25	\$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50
Cut sheets, ½c per lb. extra.		
Cut sheets to size, 1c per lb. extra.		

PLATING CHEMICALS.

Acid, boracic	\$.25
Acid, hydrochloric .....	.06
Acid, nitric .....	.14
Acid, sulphuric .....	.06
Ammonia, aqua .....	.23
Ammonium carbonate .....	.....
Ammonium chloride .....	.55
Ammonium hydrosulphuret .....	.30
Ammonium sulphate .....	.15
Arsenic, white .....	.27
Copper, carbonate, annhy .....	.50
Copper, sulphate .....	.22
Cobalt, sulphate .....	.20
Iron perchloride .....	.40
Lead acetate .....	.35
Nickel ammonium sulphate .....	.25
Nickel carbonate .....	.32
Nickel sulphate .....	.35
Potassium carbonate	1 80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1 45
Silver nitrate (per oz.)	1 20
Sodium bisulphite .....	.15
Sodium carbonate crystals .....	.05
Sodium cyanide, 127-130% .....	.40
Sodium hydrate .....	.22
Sodium hyposulphite, per 100 lbs.	6 00
Sodium phosphate .....	.18
Tin chloride	1 75
Zinc chloride, C.P. ....	.80
Zinc sulphate .....	.15

Prices per lb. unless otherwise stated.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES



ENGINEERING

Lethbridge.—A call has been sent out for a conference on March 13 of all farmers within a radius of 75 miles of Lethbridge who are interested in the three irrigation projects designed to irrigate an additional five hundred thousand acres of land in the district from the waters of the Waterton Lakes, and the Belly, St. Mary's, and Old Man rivers.

MARINE

Amherstburg.—All Canadian light stations in the lower Detroit River will be in service by Monday night next. No ice is reported along the route to Cleveland, and only a small amount of slush ice near the Cleveland docks, so that the opening trip of the Western States is expected to be without difficulty.

Quebec.—What is considered in shipping circles as a voyage extraordinary

was started from Halifax to Quebec by the Canadian Government ice-breaker, Montcalm. The vessel convoyed a vessel down the Gulf late in January, and is now on her way up the Gulf and the St. Lawrence at a date when never a ship attempted the trip.

HAMILTON.—The turbine steamer Floretta was in the bay on the afternoon of March 4, having left Kelly Harbor. The Floretta is the first boat known to the oldest residents of Hamilton to cross the bay at such an early date. Although the ice at Kelly Harbor is yet from four to nine inches thick, the Floretta had little difficulty in getting through to the open water.

Bridgeburg.—At the shipyard of the Canadian Allis-Chalmers Company the first boat of the "War Weasel" type completed in the Bridgeburg yards was launched. George W. Chase of Buffalo had charge of the ceremonies. Three boats have been under construction at

the yards and the second one is nearing completion. Work on the third ship has been stopped, but officials deny rumors that the plant is to be shut down.

Mayor McBride, just back from Ottawa, says his interview with Hon. F. B. Carvell in regard to Port Dover harbor improvements left him disgusted. "The work will not be included in the estimates. It is a straight throwdown to Brantford and the other cities and towns interested." Mayor McBride stated he was going to Galt and Kitchener and Waterloo with the intentions of arranging a conference, to be followed by big indignation meetings in every city and town in the district.

Southampton.—By a vote of 242 to 8 the people of this town carried a by-law to guarantee bonds for \$20,000 and otherwise aid the Sellers Kitchen Cabinet Co. of Canada. The chair factory here will be fitted up and manufacturing by the new company will commence at once.

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

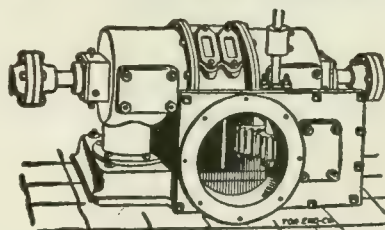
**The Thos. Davidson Mfg.
Co., Limited**

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

J. C. WILSON & CO.
BELLEVILLE, ONTARIO

Better Days Now for Galt Manufacturers

Several Plant Extensions Are Being Planned and Carried Out—
How the Industries There Are Taking Care of the After-War
Problem—New Machines Are Being Turned Out

GALT, Mar. 12.—Galt manufacturers are optimistic as to business conditions generally and the city's metal working industries are on a sound business footing at the present time. The various textile mills, shoe factories and other industries catering to the personal or household trades are in a more prosperous state than before the war, and extensions under way and recently completed are in some measure indicative of the business being received by these latter firms. Getty and Scott have taken over the old factory of the Crown Hat Works and are fitting it up for the manufacture of shoes, thus supplementing the capacity of their present plant. The Riverside Silk Mills have in the course of completion a new \$25,000 factory and will use their old factory for some time to come. This firm incidentally are the only company in Canada exclusively engaged in the throwing of silk. The Galt Robe Co. have installed new machinery and two new additions have been completed in the last eighteen months to the Newland's factory.

Municipal Activities

New pavements are contemplated for the coming year. Paving is to be laid on West Main street and mituminuous macadam on Salisbury avenue. The Hydro-Electric system and the waterworks department have been placed under a Public Utilities Commission recently formed, the city engineer being made manager of the two systems. The Galt Hydro-Electric system is supplied from a transforming station in Preston, and the voltage of the transmission line was increased Sunday last from 6,600 to 13,200 volts. Other changes have been made in the Galt station including the installation of three 750 kv-a. transformers.

Export Business is Flourishing

The ability of the Canadian manufacturer to enter the export trade is well shown in the recent activities of a number of well-known Galt industrial establishments. The Goldie and McCulloch Co. have been building marine engines for a number of years and many of the engines turned out by this firm have been for British and foreign firms. Forty compound marine engines were supplied to the British Admiralty in thirteen weeks, complete with condensers, pumps, tail and intermediate shafting and fourteen triple expansion marine engines have also been supplied to the same interests. In small lighting engines this firm has also made quite a record, three hundred having been made for the British Admiralty, the Imperial Munitions Board and other interests. The Foundation Co. recently gave an order for fourteen 600 h.p.

marine engines to the Goldie and McCulloch Co. for installation in cargo boats being laid down at Savannah, Georgia, for the French Government. Aside from the activities due to the replacement of the world's mercantile marine, other departments are showing signs of increased activity. The sale of Victory bonds has increased the average man's interest in the safe keeping of valuables and this interest is reflected in the demand on the part of the banks for deposit boxes. The Rees-Roturbo Pump for which the above firm recently acquired Canadian rights has also met with a favorable reception from Canadian purchasers.

New Building for Sheldon's Ltd.

Sheldon's Ltd. have recently completed a new pattern storage and warehouse building, three stories in height and 75 ft. by 125 ft. long. This structure is of mill construction, and is served by a railway siding for the loading and unloading of material. The present shipbuilding activity is partly responsible for the large number of Keith fan ventilating sets at present going through the shops of Sheldon's Ltd.

The Canada Machinery Corporation are employing the present release from the making of machinery for war purposes, to good advantage in the production of

machinery for the export trade and in replenishing their reserve stock. Machinery has been shipped to Italy and other countries and a two-ram double-shaper is at present going through the shops for Japan.

The R. McDougall Co.

The R. McDougall Co. have brought out a new shaper and active tooling up for its production is in progress. This machine will be reviewed in the New Equipment section of CANADIAN MACHINERY shortly. The pump department is developing the manufacture of a new line which will be on the market soon, it is expected.

The Galt Screw Co. are in an excellent position to meet demands for their product owing to the care with which the factory buildings and equipment were planned during the past munitions activity.

The expected activities promised for this spring and summer in the solving of the housing problem will result in a measurable increase in the business done by manufacturing hardware and sanitary goods firms. These trades have, during the war been somewhat quiet but the enforced inactivity will only mean the catching up of four years building in the next couple of years.

WANT COMPETENT ENGINEER TO LOOK AFTER SCHOOL BOILER PLANTS

"THAT there should be greater efficiency and safety from proper inspection of the boilers in the Toronto schools is the contention of many of those who have been following the case for some time. In the schools of Toronto there is consumed about 20,000 tons of coal per year, and the contention is that by proper inspection there could be a very material saving. In fact one of the trustees who is going into the matter very thoroughly makes the statement that it would be possible to pay \$3,000 per year to an engineer to act for the board and then show a saving of \$7,000 per annum, as well as having a greater margin of safety in the operation of the plants. The Toronto branch of the C.A.S.E. have taken the matter up and have assumed Trustee Bell that he will have their sympathy and support in the matter.

The case, as stated to CANADIAN MACHINERY by one of the Toronto engineers, is as follows: At present, those in charge of the plants have nothing in the examinations they have to pass to show for efficiency, that is, proper combustion and general economy in the boiler room. The caretakers in most

cases are paid so much per room for cleaning, etc., but in most cases they have to engage a fireman or engineer to run their heating plant during the winter months as they have no time to look after it themselves. Of course they are out to engage a man for as little as they can get him. In case the plant runs under 20 pounds pressure or is under 50 horsepower, any person can be taken on without papers, but above that size papers are required for the man who fires the boilers. The engineers contend that there should be a competent engineer to superintend these plants. The papers that are set at present have some twenty-four questions, and they cover only the rudiments of boiler and plant operation. In regard to the attitude of the C.A.S.E. in the matter, one of the officials of this organization stated to CANADIAN MACHINERY:

"We have no axe to grind in the matter. We are interested because the matter comes directly into our field and because many of us are ratepayers with children attending school. The matter was discussed at one of our meetings and we decided that we would back up Trustee Bell because we felt that he is

right in this matter. We would urge the appointment, and ask simply that it should be made on the merits of the case and entirely removed from any political or ulterior influence. It would also be well to have such an inspector of boiler plants acting separately from any other official, and he should be allowed to make his report directly to the Board of Education."

A committee from the C.A.S.E. is going to inspect several of the city schools in the near future, and they will after that appear before the Board in support of the contention of Trustee Bell who is urging that proper inspection is most necessary.

THE LARGE PART PLAYED BY THIS COUNTRY IN SHELL MAKING

The splendid part which Canada played in the production of munitions during the war was the subject of a paper read last night by Mr. H. H. Vaughan before the Montreal branch of the Engineering Institute of Canada. This review of the munitions industry of Canada which the chairman, Mr. Walter J. Francis, characterized as the most complete that has been made, was profusely illustrated by excellent lantern slides showing plants and processes. The Quebec Arsenal, the lecturer said, was a great asset in assisting manufacturers at commencement of the war, as the arsenal was actually producing ammunition, and knew how it was to be done. The original specifications called for acid open hearth steel, but through the efforts of Col. Carnegie, basic steel was accepted by the British War Office. The Nova Scotia Steel Company did useful pioneer work in obtaining the exact grade of steel required. The heat treatment had proved a troublesome problem, but it was overcome largely through the efforts of Mr. W. A. Peterson, of the C.P.R., and Mr. C. S. Winslow of the Ingersoll Rand Company.

Mr. Vaughan referred to the arrangement whereby the work was subdivided instead of the contracts being let for the manufacture of the shell complete, and he claimed that this proved a vital factor in the rapid production of shells. He traced the steps by which the output was increased and orders for various kinds of shells were placed with Canadian firms. As instances of what these plants were able to turn out, he stated that the total output of 18-pounder shrapnel was 34,078,301; of 18-pounder high-explosive shell, 5,682,834; and of the 4.5 high-explosive shells, 12,607,091. The manufacture of cartridge cases presented a novel problem which was satisfactorily solved; the cases being turned out in very large quantities. A yet more difficult problem was the production of cordite, generally known as T.N.T., also fuses, but the resources and energy of Canadian manufacturers proved equal to this dangerous work. The result was that Canada was able to make big shipments of shells at a time when they were badly needed, and at the close of the war special letters of thanks had been received

PERSONAL

Capt. S. H. E. (Harry) Mitchell, son of Mr. and Mrs. D. T. N. Mitchell, of Collingwood, recently returned from overseas where he spent two years in the auxiliary service of the Royal Navy, the greater part of the time mine sweeping on the east coast of Scotland. During his service he saw a number of German subs, two or more of which were put out of business, while on one occasion his trawler was blown up, all the crew except one officer and himself being lost. This was off the coast of England and in a fairway to cross the channel.

aid by the Imperial Munitions Board from both Premier Lloyd George and Winston Churchill, Minister of Munitions acknowledging what the Dominion had done in this respect. The speaker said that the difficulties of the work of the Shell Committee and the ability with which it was carried out had not been as generally recognized as was deserved. That committee had devoted much earnest, hard work and shown much ability in the execution of the task entrusted to it.

Cost of Shells

With regard to the prices paid for shells, Mr. Vaughan declared that liberal prices were a necessity in order to enable a manufacturer to spend money freely so as to secure his output and increase his plant. The great end in view at that time was the fulfilment of the specified deliveries, and subsequent events proved that the policy adopted by the Shell Committee not only brought quick results but obtained them more cheaply than could have been done in any other way. The committee returned to the War Office \$34,000,000 out of a total of \$340,000,000 which they were authorized to expend.

Consequent on the reorganization of the Shell Committee the work developed to still greater proportions, and orders for six, eight, and 9.2-inch shells came, the value of the first-named being greater than any other size. During 1917 Canada manufactured 55 per cent. of the 18-pounder shrapnel, 42 per cent. of the 4.5-inch, 27 per cent. of the 6-inch, 20 per cent. of the 60-pounder, 15 per cent. of the 8-inch, and 16 per cent. of the 9.2-inch shells supplied to the British Government. The Munitions Board were also responsible for the production of 2,921 aeroplanes and thirty flying boats. Altogether the Board produced 67,000,000 shells at a cost of twelve hundred million dollars, and this represented the output of over 450 plants. This production required two million tons of steel, 18,000 tons of copper, 25,000 tons of spelter, and 138,000 tons of lead, and in addition, twenty-seven million dollars' worth of shell boxes and similar material.

TENDERS

HALIFAX.—Tenders will be received by L. Fred Monaghan, city clerk of Halifax, up to March 19, for the work of the various trades required in the erection of a Hospital Building on the Geizer Property at Dutch Village, Halifax, under the following headings: 1, excavating, concrete, masonry, plastering, car-

WOODLAND Fire Bricks

And Other Grades
**CUPOLA BLOCKS
FIRE CLAY**

Prompt Shipment

From our Stock at
MONTREAL

We Solicit Your Inquiries

**HARBISON-WALKER
REFRACATORIES CO.**
OF CANADA, LIMITED

Office and Warehouse:
**301 ATWATER AVENUE
MONTREAL, QUE., CANADA**

METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

HAWK D CHROME VANADIUM STEEL



You Know How Greatly it Increased Production

You know how it proved to be without equal for both first and second operation punches—how, in both Canadian and American shell plants, this heat-treated ready-for-use steel enabled each punch to turn out over 2,000 shells.

Hawkrige Brothers' steel for every commercial requirement is just such production-increasing steel as proved this "Hawk" D. Chrome Vanadium. We make

Steel of Every
Description

Hawkrige Brothers Company

303 Congress St., BOSTON, MASS.
U. S. A.

'Barnes-Made' Springs

are unusual in
service and wear.

They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

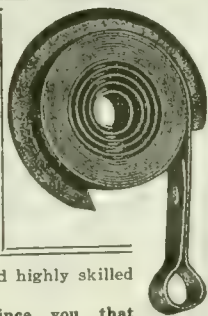
A trial will convince you that "Barnes-Made" Springs are the best buy.

Established 1852

THE WALLACE BARNES COMPANY

218 South St., Bristol, Ct., U. S. A.

Makers of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire



GRAPHIC PRODUCTION CONTROL

Increases Output
Write -

Anderson's Efficiency Service
380 Queen St. West Toronto, Canada

PATENTS FOR SALE

Two Canadian Patented
Steam Specialties for
sale; one Steam Trap,
Patent Number 187215,
and one Steam Separator,
Patent Number 183340.

Allentown Experimental Works

Allentown, Pa., U.S.A.

Machine Tools for Iron & Steel Works.

We shall be glad to hear from firms contemplating
improvements or complete installations.

BERTRAMS LIMITED
SCIENNES EDINBURGH

PLEWES Limited

WINNIPEG
For All

Machinists' Supplies

CASTINGS

Medium Weight Grey Iron, Brass, Etc.
JOBGING

GREENLEAFS, LIMITED

Belleville, Ontario

OVENS

Japanning and Varnishing Ovens
heated by Gas, Electricity,
Steam or Coal.
Kerchen Siphonage Ventilators, Bakers'
Ovens, trucks, casters, etc.
Write for Booklet.

Brantford Oven & Rack Co., Ltd.
Brantford, Canada.

pantry, iron work, roofing, tile work,
etc; 2, plumbing; 3, painting; 4, electric
wiring and elevator; 5, heating.

TRADE GOSSIP

An Important Point.—Holding that the attachment of a piece of machinery securely to the wall of a building did not make that machinery a permanent part of the building and as such an "immovable" under the law; that an indispensable condition to thus changing a piece of

machinery from a "movable" to an "immovable" was that the machinery and the building should at one and the same time be the property of the individual making the change, Mr. Justice Mercier in the Superior Court at Montreal, maintained a seizure made by the Matthew Moody & Sons Company, upon certain machinery and effects in Francois Xavier's mill at St. Anicet, Huntingdon County, and ordered the defendant Dupuis to return the machinery to plaintiffs or pay its value.

OTTAWA.—The nationalization of the port of St. John N.B., is now the subject of conference between the Government and representatives of that city and it is probable that the Government and representatives of that city, and it is probable that the Government will take over the harbor and shipping facilities and make it a national port. Mayor R. T. Hayes and T. H. Bullock, Commissioner of Harbor, Ferries and Lands, of St. John, have been in Ottawa since Sunday attending conferences with members of the Government arranged by K. W. Wigmore, M.P., for St. John, and, and, according to information gained, the Government will take over the operation of the port in the near future.

ALL RECORDS BROKEN ON HAMILTON TRIP

Macassa Got Away For the Season's
Run on the Sixth Day
of March

Breaking all records for navigation out of the port of Toronto, the steamer Macassa left Saturday afternoon for Hamilton with a mixed cargo of package freight. This is the earliest reported sailing from the port and is only rivalled by the year 1906 when the same steamer left the port on March 11, but was forced to discontinue sailings on account of ice after making several trips.

The Macassa is under the command of Captain G. J. Corson, who has with him Chief Engineer E. A. Prince and Purser J. Beckton.

The Toronto to Hamilton ship Macassa is a veteran of the Great Lakes and enters to-day her 31st season since she was built on the banks of the River Clyde in Scotland and crossed the Atlantic ocean under her own steam to enter the lake navigation service.

This time last year there was three feet of blue ice in Toronto bay and it was not until March 30 that the Macassa left on the first trip to Hamilton.

Navigation Openings

The following table give the opening of navigation for the past ten years with the first ship to arrive in port:

1909, Maple Leaf, March	31
1910, Macassa, March	28
1911, Macassa, March	30
1912, Macassa, April	9
1913, Dalhousie City, April	12
1914, Dalhousie City, April	2
1915, Dalhousie City, April	1
1916, Dalhousie City, April	4
1917, Macassa, March	30
1918, Macassa, March	30
1919, Macassa, March	6

The Parade Failed.—"It's all off. There's not going to be any demonstration as there is no use in our claiming that thousands are out of work and go to the Parliament Buildings with only a few hundreds to make a demonstration on the unemployment situation in this city," said Mr. William Storey, business agent of the Plumbers and Steamfitters, at the Labor Temple. A demonstration was to have been arranged in which thousands in the city reputed to be out of employment were to go to the Legislature with a view to impressing that body with the necessity of doing something to provide work for men out of jobs. A meeting was called to make all arrangements for the demonstration, which was to take the form of a parade, but the meeting lacked enthusiasm.

Unemployment Figures.—The Employment Service of the Department of Labor reports that for the week ending February 22, employment returns were received from 1,561 firms in Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island. The total number of persons on the payrolls of these firms February 22 was 168,137, and the number of persons anticipated to be on the payroll on March 1 was 166,806, a reduction of 1,331, or .791 per cent. Reports from trade unions for January 31 which have been received by the Employment Service indicate that while there was a considerable volume of unemployment on that date—3.9 per cent.—the country is still far from the hard times of the winter of 1915, the percentage of trade union members reported unemployed on December 31, being 8.7.

A Peculiar Case.—Ex-Ald. Thomas Roden and a deputation of the Canadian Manufacturers' Association waited on the Toronto Board of Control to record their objection against the city's interference in the trouble between the Gutta Percha Rubber Company and the residents of West Lodge avenue, who complain of the incessant vibration of machinery on the plant. Mr. Roden, who was the spokesman of the deputation, stated that all the manufacturers of the city were concerned over the action of the Health Department in summoning the offending company to the police court for maintaining a nuisance. Industries, he said, should be encouraged to come here. "The street railway runs 24 hours a day," he claimed further. Mayor Church reminded the deputation that the people in that district were unable to sleep at nights. To Controller Maguire Mr. Roden admitted that no members of the association had been to visit the plant, but the stoppage of the machinery that caused the noise would throw 1,500 men out of work.

BOOK REVIEWS

Electro-Metallurgy. Electrolytic and Electro-thermal Processes. By Eric K. Rideal, Bailliere, Tindall and Cox, London.

The rapid development of applied chemistry in recent years, accelerated

by the recent war, has brought about a revolution in all branches of technology. A series of books, of which the present publication is one are being prepared by the publishers as an aid to the further development of industrial chemistry throughout the British empire. This series will give a general survey of the particular portion of the science dealt with and each volume is complete in itself. The present volume is divided into eight main sections dealing with electrolysis in aqueous solutions; electrolysis in fused electrolytes; the electrolytic preparation of the rare metals; electro-thermal processes; carborundum and oxysilicides of carbon; the carbides; electro-thermal nitrogen fixation by metals and metallic compounds, and iron and the ferro-alloys.

In an introduction to the above sections the problems relating to the ample supply of power necessary for electro-metallurgical operations are dealt with and interesting figures relative to comparative costs of power production by present methods, hydro-electric, coal, gas and oil are given. In Great Britain, where waterpowers are scarce and coal plentiful, the cost of producing power by the latter would seem to be sufficiently low to warrant the establishing of electro-chemical plants using it as fuel. The metalliferous resources of the British Commonwealth are also dealt with in the introduction.

In the section devoted to electrolysis in aqueous solutions the winning and refining of copper is thoroughly taken up and special mention is also made of the use of colloid addition agents in electrolytic work. The other metals treated of in this section are zinc, cadmium, gold, silver, nickel, lead, antimony, bismuth, tin, cobalt and cobalt nickel alloys. In general this section may be said to be an exhaustive summary of present day practice.

In the section devoted to fused electrolytes, the preparation of sodium potassium, lead zinc, aluminum and other metals is dealt with. A portion of the book which is of considerable interest deals with the preparation of the rarer metals which are finding increasing application in modern industry. The section on electro-thermal processes deals with the smelting of and reducing of the metallic elements from their ores and also with the preparation of graphite and other electric furnace products.

Carborundum, carbides and the fixation of atmospheric nitrogen are also considered and an important part of the contents is related to the iron and steel industry.

As a reference aid to the metallurgist engineer or chemist interested in electro-metallurgy this publication should find considerable usefulness and the excellent bibliography which is incorporated at the end of each section is of considerable assistance to those wishing to make further investigation.

The value of the work is greatly enhanced by the incorporation of much material in the nature calculations as to energy requirements for electrolytic and electro-thermal processes.

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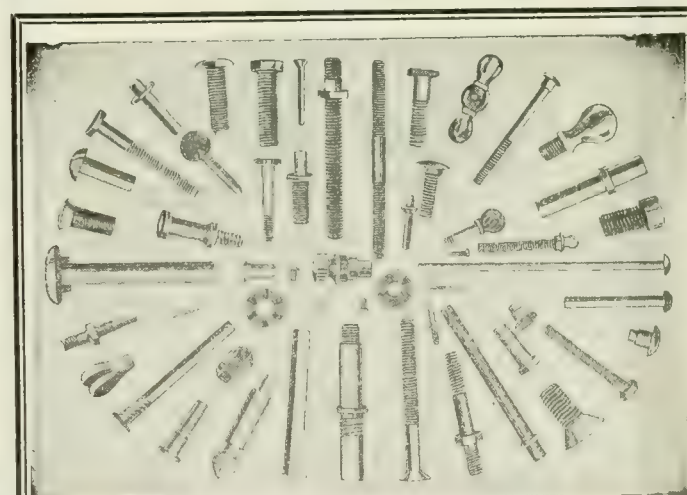
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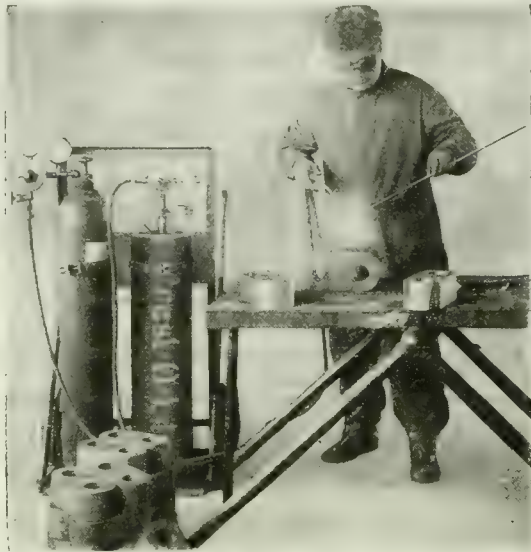
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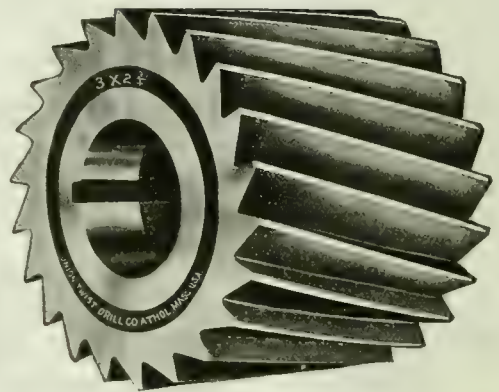
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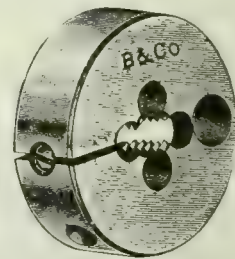
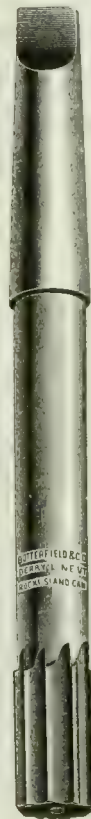
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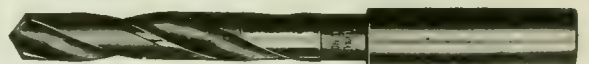
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Do High Prices of Machine Tools Hinder Sales?

THE question asked of a considerable dealer in Toronto by THE FINANCIAL POST is answered by him in THE POST of March 8th, in part, as follows:

"New lists that are coming out do not show concessions in prices. As long as firms can sell at the present prices there is not much chance for a lower level of values."

The rest of that article in THE POST is interesting, and here are some other extracts worth noting from POST items of this week:

Implement Manufacturers May Unite for Export Trade

"Representatives of the implement manufacturers have been at Ottawa in consultation with the Canadian Trade Commission to arrange for the pushing of their export business. What is likely to be proposed to them is that they should work in concert, and their orders abroad should be placed through a central selling body, the expenses of conducting which should be maintained by a pro rata tax on each member of the association. They will provide their own credits from a common fund, which can be created by contributions gauged according to the respective interests involved."

Steel Market Is Still Unsettled

Big American Interests Co-operating in Secretary Redfield's Plan

The talk of lower prices for steel continues in the market. It is a fact that the "set prices" of the war period have, in many ways, spoiled the trade for what has followed. When prices were fixed, buyers and sellers knew their ground for the coming three months. Not only so, but they were quite certain that when changes would be made they would not be radical, and would be in keeping with the cost of material and labor entering into the output.

Last week a number of prominent steel producers were meeting in New York, and according to the authorized version they "discovered" that George N. Peek, recently named by Secretary Redfield as chairman of "The Industrial Board of the Department of Commerce" was in town, and accordingly they invited him in to explain Secretary Redfield's plan for the deflation of war-time prices. Indications are that the steel producers are going to make a show of resisting the movement, but will gracefully yield at the last moment.

Above is part of a front-page news item in THE POST of March 8th.

Latest Activities of Steel and Iron Using Interests

Stove Manufacturers Out For Export Trade

"The Canadian stove and enamelled ware manufacturers are making an aggressive effort to develop export business and to secure orders from Europe, Australia, New Zealand and South Africa. A. M. Smith, sales manager of the McClary Manufacturing Company, will, on behalf of the manufacturers, make a personal investigation of European prospects."

New Ship Repair Plant For Vancouver

"Seattle men propose to build at Vancouver, B.C., a steel dock of 25,000 tons, capable of handling the largest ships which make the Port of Vancouver. Embraced in the enterprise will be a shipbuilding and repair plant, the whole to cost in the neighborhood of \$4,000,000."

New Iron Industries For Border Cities

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Business Building News Items Appear Each Week in *The Financial Post*

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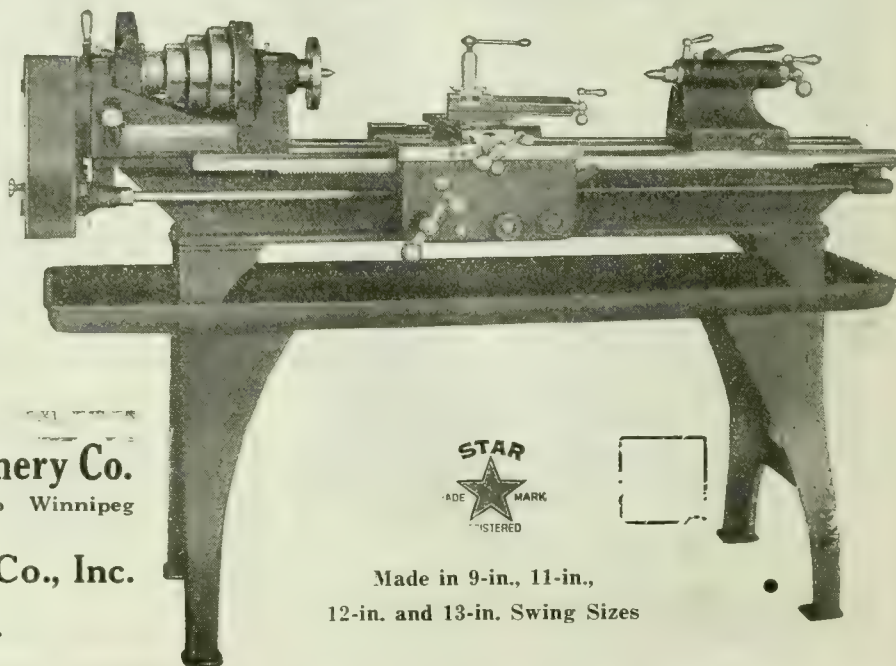
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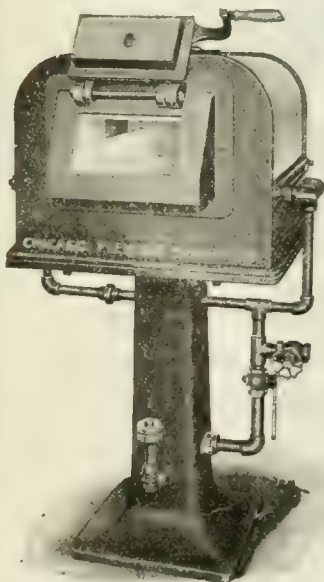


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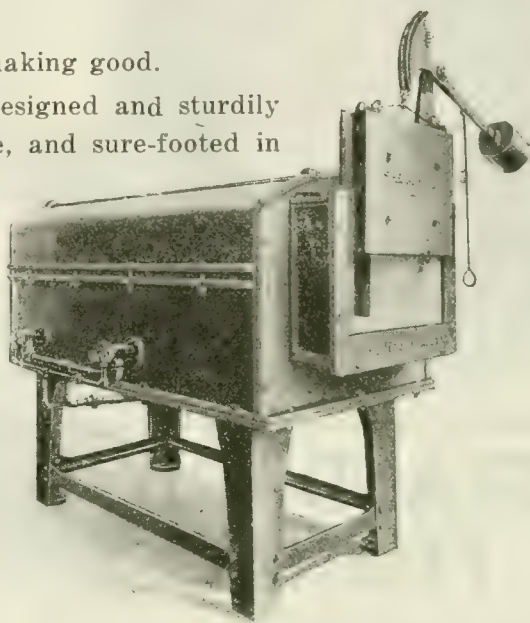
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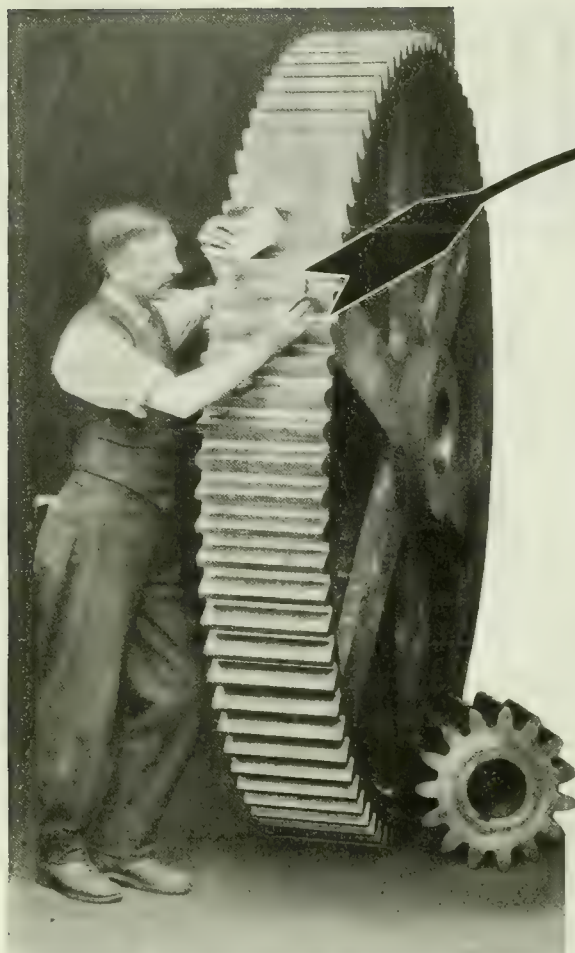
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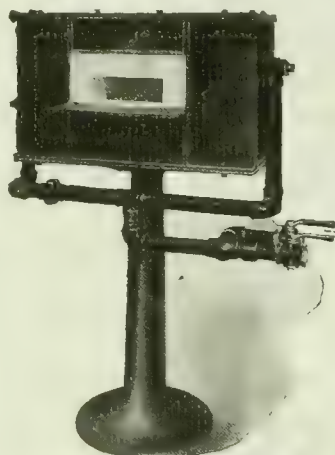
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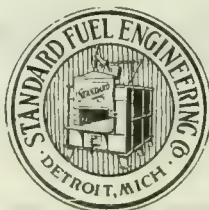


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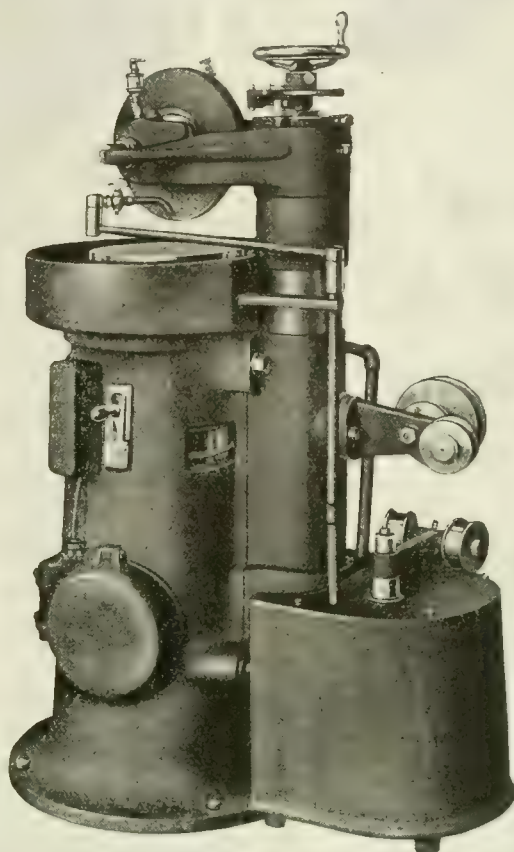
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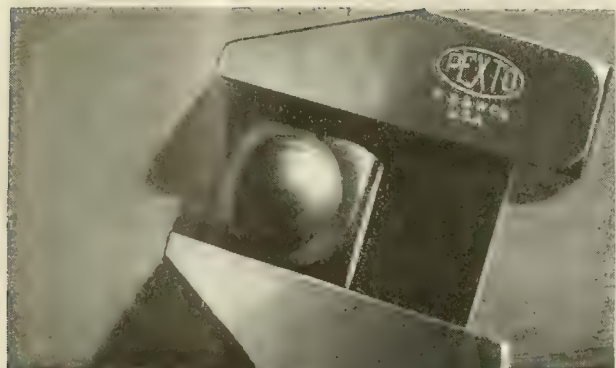
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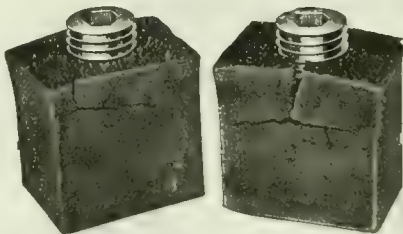
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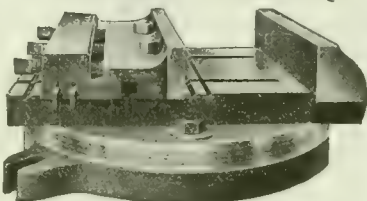
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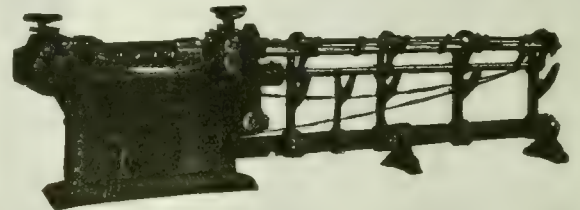
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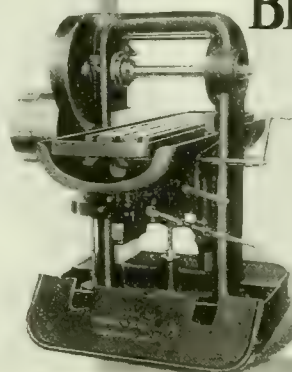
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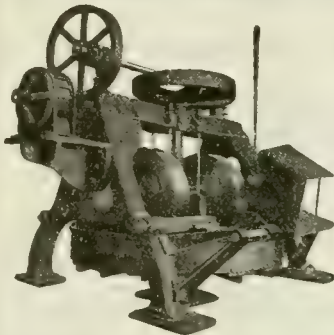
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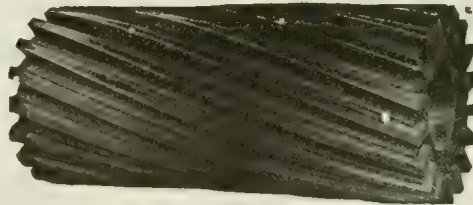
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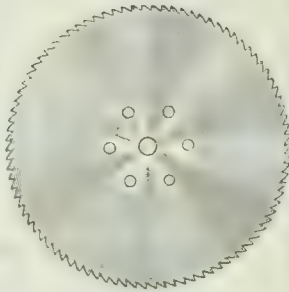
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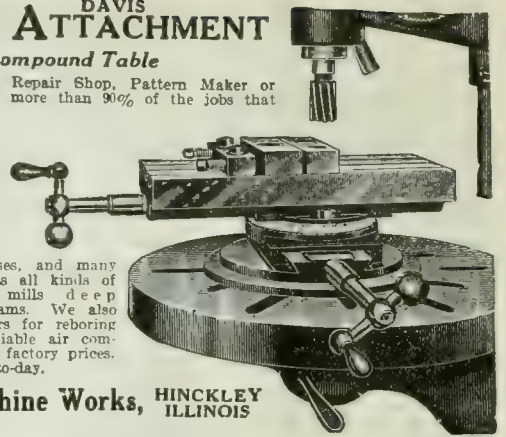


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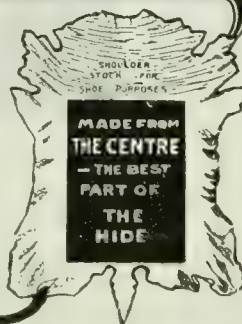


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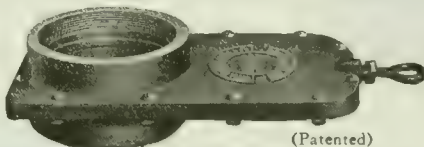
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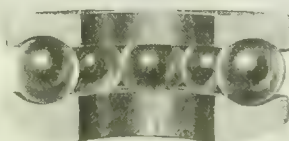
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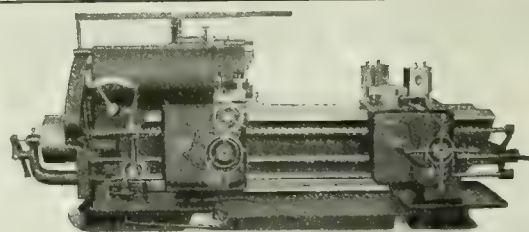
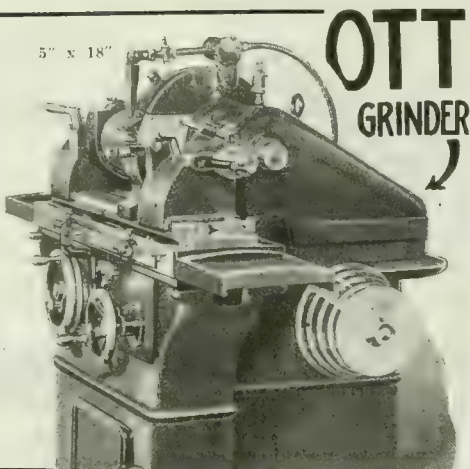
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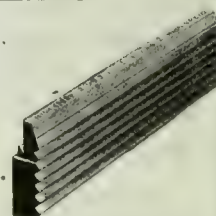
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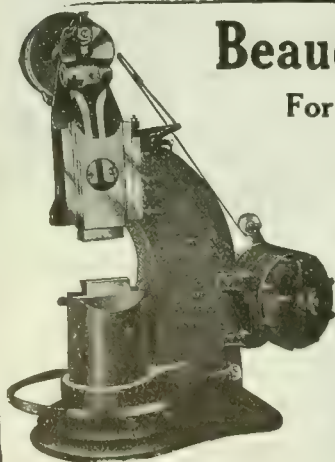


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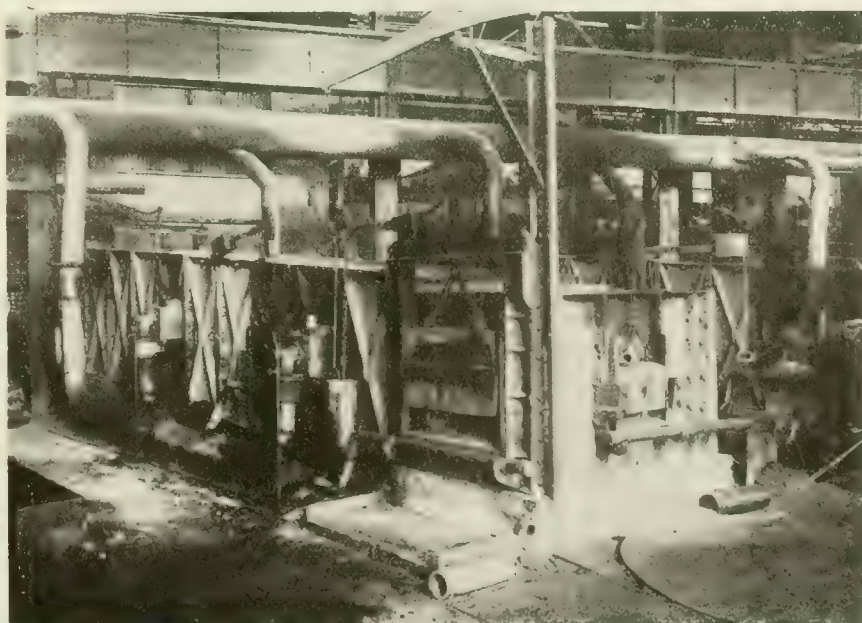
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Foss Mch. & Supply Co., The Geo. F., Montreal.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Jacobs Mfg. Co., Hartford, Conn.
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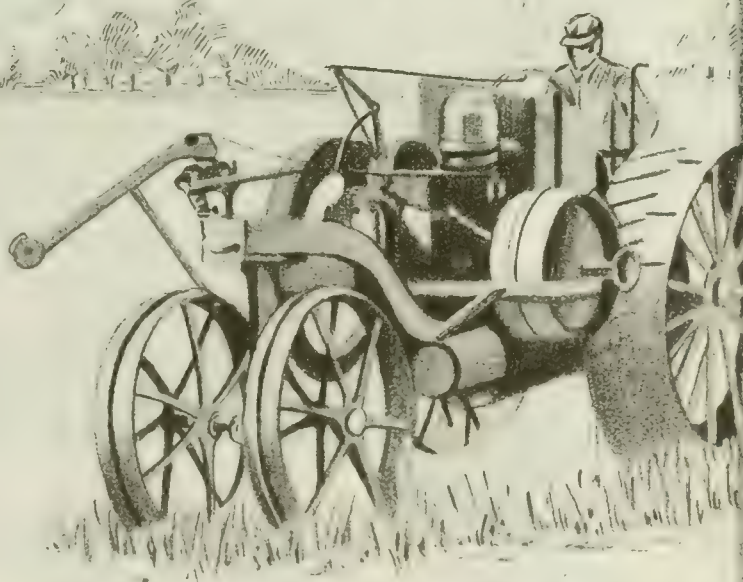
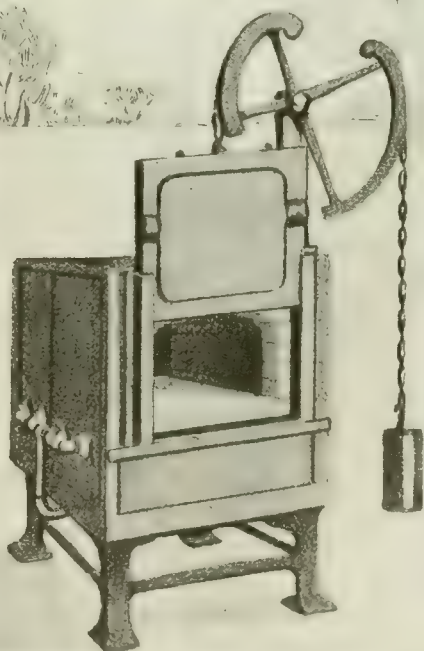
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Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
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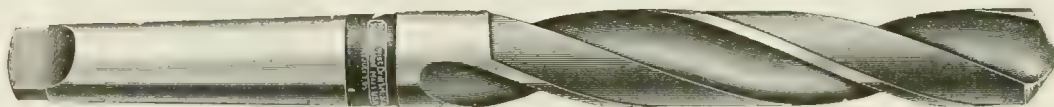
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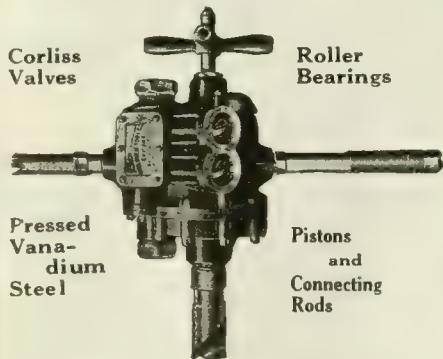
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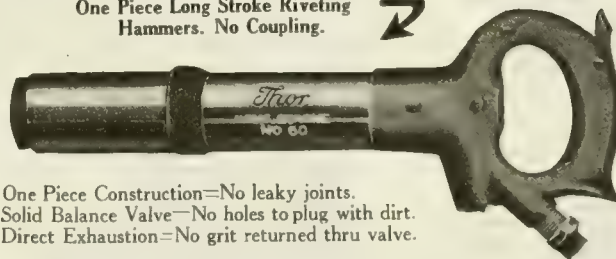
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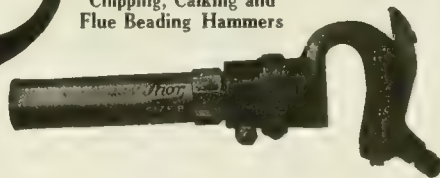
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Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
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Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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DRILLS, BLACKSMITH AND BIT STOCK

Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mch. & Supply Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ELECTRIC AND PORTABLE

Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Baker & Co., Inc., H. Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mch. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY

Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM

Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST

Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Dmy Co., Montreal.
The Geo. F. Foss Mch. & Supply Co., Montreal.
McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.

Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, OIL TUBE

Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, PNEUMATIC CORNER

Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND

Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK

Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mch. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK

Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mch. & Supply Co., Montreal.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

DRIVES, CHAIN

Can. Link-Belt Co., Toronto, Ont.
Correnty Chain Co.,
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRY CLEANING SYSTEM

Bowser & Co., S. F., Inc., Fort Wayne, Ind.

DRYERS, SAND

Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES

Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS

Electric Steel & Metals, Ltd., Welland, Ont.

DUMP CARS

Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM

Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT

Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES

Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELEVATOR MACHINERY

Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

ELEVATOR WEIGHTS

Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS

Can. Link-Belt Co., Toronto, Ont.

Curtis Pneumatic Machy. Co., St. Louis, Mo.

Williams & Wilson, Limited, Montreal, Que.

ELEVATING AND CONVEYING MACHINERY

Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY GRINDERS (PNEUMATIC)

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Ford-Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS

Baxter & Co., Ltd., J. R., Montreal, Que.
Brantford Emery Wheel Co., Brantford, Canada.
Foss Mch. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

EMERY WHEEL DRESSINGS

Wheel Trueing Tool Co., Windsor, Ont.

ENGINES, STEAM, GAS, GASOLINE

Canadian Fairbanks-Morse Co., Montreal.
Gutta Percha & Rubber, Ltd., Toronto, Can.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL

Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINE SHAFTS

Hammond Steel Co., Inc., Syracuse, N.Y.

ENGRAVERS

Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS

Parmenter & Bulloch Co., Gananoque, Ont.

ETCHING MACHINES

Brewster Co., Wm., New York, N.Y.

EXHAUST HEADS AND HOODS

Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS

Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

EXTRUSION DIE STEEL

J. F. A. Comstedt, New York City, N.Y.

EXTRACTORS, TAP

Walton Co., The, Hartford, Conn.

EXTRA TOOL STEEL

J. F. A. Comstedt, New York City, N.Y.

EYE BOLTS AND NUTS

Can. Foundries & Forgings, Ltd., Welland, Ont.
United Brass & Lead, Ltd., Toronto.

FACTORY GATES

Page Steel & Wire Co., Adrian, Mich.

FANS

Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

FENCING, WIRE

Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Limited, Montreal, Que.

FENCE, IRON AND FACTORY

Canada Wire & Iron Goods Co., Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN

Vanadium-Alloys Steel Co., Pittsburgh, Pa.

FILES

Aikenhead Hardware Co., Toronto, Ont.
Adams & Co., Wm., Sheffield, Eng.
Delta File Works, Philadelphia, Pa.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Marshall & Co., Geo., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

FILLING STATION EQUIPMENT

Bowser & Co., S. F., Inc., Fort Wayne, Ind.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL

Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Canada Wire & Iron Goods Co., Hamilton, Ont.

FIRST AID CABINETS

Strong, Kennard & Nutt Co., Cleveland, Ohio.

FIRE BRICKS

Harbison-Walker Refractories Co. of Canada, Montreal, Que.

FITTINGS, MALLEABLE AND CAST IRON

Fittings, Ltd., Oshawa, Ont.

FIXTURES

Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY

Sleeper & Hartley, Inc., Worcester, Mass.

FLANGING CLAMPS

Wickes Bros., Saginaw, Mich.

FORGES, HAND PORTABLE

Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Sheldons, Ltd., Galt, Ont.

FORGINGS, STEEL AND IRON

Can. Foundries & Forgings, Ltd., Welland, Ont.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE

AND LOCOMOTIVE

FORGING AND WELDING

Victoria Foundry Co., Ottawa.
Can. Billings & Spencer, Ltd., Welland, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY

John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Rogers Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal, Que.

FORGINGS, SPECIAL

Armstrong, Whitworth of Canada, Montreal, Que.
Canada Foundries & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

FRICTION LEATHERS

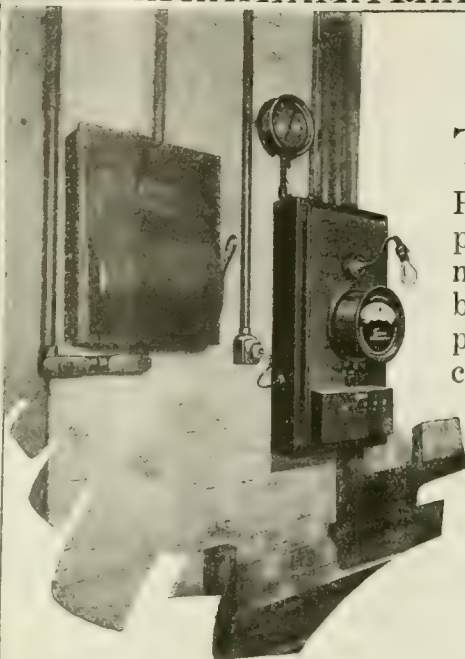
Graton & Knight Mfg. Co., Montreal.

FRICTION SURFACE BELTING

Can. Consolidated Rubber Co., Ltd., Montreal.

FUEL OIL SYSTEMS

Bowser & Co., S. F., Inc., Fort Wayne, Ind.
Gilbert & Barker Mfg. Co., Springfield, Mass.



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Announcement

Our Montreal Friends and Customers will doubtless be pleased to learn that we have opened an Office, Warehouse and Service Station at 337 Craig Street, Montreal, Quebec, where a large stock of Cleveland Air Tool, Appliances, Sundries and Repair parts will be carried in stock for immediate delivery. Prompt and efficient service is the "Keynote" of our organization and guaranteed to all alike.

C. D. GARNER

MANAGER

Cleveland Pneumatic Tool Co., of Canada, Ltd.
84 Chestnut St., Toronto, Ont. 337 Craig St., Montreal, Que.

FURNACES, ANNEALING, CASE HARDENING AND TEMPERING

Belleve Furnace Co., Detroit, Mich.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Mechanical Engineering Co., Three Rivers, Que.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Limited, Montreal, Que.

FURNACES, BLAST

Belleve Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING

Gilbert & Barker Mfg. Co., Springfield, Mass.
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL, SHELL

Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, LEAD AND SALT

Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING

Standard Fuel Engineering Co., Detroit, Mich.

FUSE BOXES, STEEL

Dom. Forge & Stamping Co., Walkerville, Ont.

GAUGES, MANUFACTURERS, LIMIT, THREAD

Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

GALVANIZING PLANT

Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

GANG PLANER TOOLS

Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.

Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS

Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE TANKS

Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GASOLINE PUMPS, SELF-MEASURING

Bowser & Co., S. F., Inc., Fort Wayne, Ind.

GAUGES

Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

GAUGES, CALIPERS

Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT

Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE

Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC

Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD

Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Normac Machine Co., St. Catharines, Ont.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 336 Stair Bldg., Toronto, Ont.
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, VACUUM AND PRESSURE

Bristol Co., Waterbury, Conn.

Taylor Instrument Co., Rochester, N.Y.

GEAR BLANKS

Can. Steel Foundries, Ltd., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST

Katie Foundry, Galt, Ont.

GEAR-CUTTING MACHINERY

Bilton Mach. Tool Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE

Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL

Bridgeport Mach. Tool Works, Rochester, N.Y.

GEAR BOXES, REDUCTION

Coventry Chain Co., Coventry, Eng.

GEARS, CUT, MORTISE, ANGLE, WORM

Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Ltd., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
Jones & Glasco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE

Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glasco, Montreal.
Philadelphia Gear Works, Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

GENERATORS, ELECTRIC

Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GENERATORS, MOTOR

MacGovern & Co., Montreal, Que.

GERMAN SILVER

Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

GLASSES, SAFETY

Strong, Kennard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL

Wilson & Co., J. C., Belleville, Ont.

GRAPHITE

Aikenhead Hardware, Ltd., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.

GOOGLES

Consolidated Optical Co., Toronto, Ont.
Standard Optical Co., Geneva, N.Y.
Strong, Kennard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

GRAVITY CARRIERS

Can. Link-Belt Co., Toronto, Ont.
Jones & Glasco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

GREASE CUPS, PRESSED STEEL, BRASS

Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (SEE LUBRICANTS)**GRINDERS, AUTOMATIC KNIFE**

W. H. Banfield & Son, Toronto.
Canada Machinery Corp., Galt, Ont.
Foss Mch. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH

Blake & Johnson Co., Waterbury, Conn.
Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mch. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
New Britain Machine Co., New Britain, Conn.
Perfect Machine Co., Galt, Ont.
United States Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CUTTER

Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Milling Mach. Co., Cincinnati, Ohio.
The Geo. F. Foss Mch. & Supply Co., Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.

Greenfield Tap & Die Corp., Greenfield, Mass.

Head Machine Co., Worcester, Mass.

Landis Tool Co., Waynesboro, Pa.

LeBlond Mach. Tool Co., R. K., Cincinnati, O.

Norton Grinding Co., Worcester, Mass.

Perfect Machine Co., Galt, Ont.

Pratt & Whitney Co., Dundas, Ont.

Wells Bros. of Can., Galt, Ont.

Williams & Wilson, Limited, Montreal, Que.

GRINDERS, DIE AND CHASER

Landis Machine Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK

Armstrong Bros. Tool Co., Chicago, Ill.

Ford-Smith Mach. Co., Hamilton, Ont.

Gardner Machine Co., Beloit, Wis.

Head Machine Co., Worcester, Mass.

GRINDERS, DRILL

Aikenhead Hardware Co., Toronto, Ont.

The Geo. F. Foss Mch. & Supply Co., Montreal.

Garvin Machine Co., New York.

Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.

Greenfield Tap & Die Corp., Greenfield, Mass.

United States Electrical Tool Co., Cincinnati, O.

Wells Bros. of Can., Galt, Ont.

Williams & Wilson, Limited, Montreal, Que.

GRINDERS, CYLINDER, INTERNAL

Brown & Sharpe Mfg. Co., Providence, R.I.

The Geo. F. Foss Mch. & Supply Co., Montreal.

Greenfield Machine Co., Greenfield, Mass.

Head Machine Co., Worcester, Mass.

Landis Tool Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

Norton Grinding Co., Worcester, Mass.

Perfect Machine Co., Galt, Ont.

Williams & Wilson, Limited, Montreal, Que.

GRINDERS, PORTABLE, ELECTRIC

Hand. Tool Post, Floor and Bench

Aired Machine Co., Bridgeport, Conn.

Brown & Sharpe Mfg. Co., Providence, R.I.

Cincinnati Electrical Tool Co., Cincinnati, Ohio.

Ford-Smith Mach. Co., Hamilton, Ont.

The Geo. F. Foss Mch. & Supply Co., Montreal.

Grant Mfg. & Machine Co., Bridgeport, Conn.

Garlock-Walker Machinery Co., Toronto, Ont.

Greenfield Machine Co., Greenfield, Mass.

Independent Pneumatic Tool Co., Chicago, Ill.

United States Electrical Tool Co., Cincinnati, O.

A. R. Williams Machy. Co., Toronto.

Williams & Wilson, Ltd., Montreal, Que.

Wilkinson & Kompas, Hamilton, Ont.

GRINDERS, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Garlock-Walker Machinery Co., Toronto, Ont.

Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, ROTARY SURFACE

Bristol Machine Tool Co., Bristol, Conn.

Armstrong Bros. Tool Co., Chicago, Ill.

W. F. & John Barnes Co., Rockford, Ill.

Blake & Johnson Co., Waterbury, Conn.

Blount, J. G., & Co., Everett, Mass.

Brown & Sharpe Mfg. Co., Providence, R. I.

Ford-Smith Machine Co., Hamilton, Ont.

Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.

Greenfield Machine Co., Greenfield, Mass.

Greenfield Tap & Die Corp., Greenfield, Mass.

National-Acme Co., Cleveland, Ohio.

Tabor Mfg. Co., Philadelphia, Pa.

Wells Bros. of Can., Galt, Ont.

Wing & Son, J. E., Hamilton, Ont.

GRINDERS, UNIVERSAL, PLAIN

Grand Rapids Grinding Mach. Co., Grand Rapids, Mich.

Modern Tool Co., Erie, Pa.

Norton Grinding Co., Worcester, Mass.

Williams & Wilson, Limited, Montreal, Que.

GRINDERS, VERTICAL SURFACE

Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.

Head Machine Co., Worcester, Mass.

Pratt & Whitney Co., Dundas, Ont.

Reed-Prentice Co., Worcester, Mass.

Wing & Son, J. E., Hamilton, Ont.

Gisholt Machine Co., Madison, Wis.

Norton Grinding Co., Worcester, Mass.

Williams & Wilson, Limited, Montreal, Que.

GRINDING AND POLISHING**MACHINES, PORTABLE, PNEUMATIC****AND SPRING FRAME**

Can. Fairbanks-Morse Co., Montreal.

Cincinnati Electrical Tool Co., Cincinnati, Ohio.

Ford-Smith Mach. Co., Hamilton, Ont.

Gardner, Robt., & Son, Montreal.

Garvin Machine Co., New York.

Garlock-Walker Machinery Co., Toronto, Ont.

Greenfield Machine Co., Greenfield, Mass.

Hall & Sons, John H., Bradford, Ont.

LeBlond Mach. Tool Co., R. K., Cincinnati.

Niles-Bement-Pond Co., New York, N.Y.

Norton Grinding Co., Worcester, Mass.

Wisconsin Electric Co., Racine, Wis.

Williams & Wilson, Limited, Montreal, Que.

GRINDING MACHINES, CAR WHEEL,**CUTTER, CYLINDRICAL, CRANKSHAFT**

Norton Grinding Co., Worcester, Mass.

GRINDING WHEELS

Aikenhead Hardware Co., Toronto, Ont.

Baxter Co., Ltd., J. R., Montreal, Que.

Brantford Emery Wheel Co., Brantford, Canada.

Can. Fairbanks-Morse Co., Montreal.

Ford-Smith Machine Co., Hamilton, Ont.

The Geo. F. Foss Mch. & Supply Co., Montreal.

Norton Co., Worcester, Mass.

GRIT, ANGULAR

Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

GUARDS, WINDOW AND MACHINE

Canada Machinery Corp., Galt, Ont.

Canada Wire & Iron Goods Co., Hamilton, Ont.

Dennis Wire & Iron Works, London, Ontario.

New Britain Mach. Co., New Britain, Conn.

Page Steel & Wire Co., Adria, Mich.

GUN TAPS

Greenfield Tap & Die Corp., Greenfield, Mass.

Wells Bros. of Can., Galt, Ont.

HANDLES, BALANCE, CRANK AND MACHINE

Williams & Co., J. H., Brooklyn, N.Y.

HACK SAW BLADES

Aikenhead Hardware Co., Toronto, Ont.

Baxter & Co., Ltd., J. R., Montreal, Que.

Boker & Co., Inc., H., Montreal, Que.

Can. Fairbanks-Morse Co., Montreal.

Diamond Saw & Stamping Works, Buffalo, N.Y.

Ford-Smith Machine Co., Hamilton, Ont.

The Geo. F. Foss Mch. & Supply Co., Montreal.

Fry's (London), Ltd., London, England.

Racine Tool & Machine Co., Racine, Wis.

Pewees, Ltd., Winnipeg, Man.

Rice Lewis & Son, Toronto, Ont.

Simonds Mfg. Co., Fitchburg, Mass.

L. S. Starrett Co., Athol, Mass.

Standard Machy. & Supplies, Ltd., Montreal, Que.

Victor Saw Works, Ltd., Hamilton, Canada.

Wilkinson & Kompas, Hamilton, Ont.

Williams & Wilson, Limited, Montreal, Que.

HACK SAW FRAMES

Aikenhead Hardware Co., Toronto, Ont.

Can. Fairbanks-Morse Co., Montreal.

Ford-Smith Machine Co., Hamilton, Ont.

Garvin Machine Co., New York City.

Victor Saw Works, Hamilton, Ont.

Rice Lewis & Son, Toronto, Ont.

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What is known about the onions is told by Lieut. J. Vernon McKenzie in the course of an article, "Raiding the Rhineland," in MARCH MACLEAN'S. It is an intensely interesting article, telling all about the great reprisal campaign which implanted the fear of war in the German civilian heart.

"NO HOPE FOR THE WETS"

"Already the temperance forces are lined up to stop any possible break in the prohibition dam," writes J. K. Munro, in discussing what is going to happen at the coming session at Ottawa. He predicts that Union Government will hold together, but that the habit it has contracted of promising everything asked is going to make a lively session. He expects:

Dry legislation at the earliest possible moment.
The moral reform forces in control.
No change in the Divorce Law.
Tariff concessions made to the West.

*The March number, in fact, is full of live, up-to-the-minute features.
The famous Canadian Ace, Lieut.-Colonel W. A. Bishop is on the cover.*

Some of the outstanding articles and stories are:

The Transformation (a new serial)—By Frederic S. Isham.

A Canadian King-maker (the story of Lord Beaverbrook in Britain)—By Maurice Woods.

Fitting in the Returned Soldier—By George Pearson.

The Three Sapphires—By W. A. Fraser.

The Strange Adventure of the Nile Green Roadster—By Arthur Stringer.

Fakers—and Others—By E. Ward Smith.

Lend Me Your Title—By Onoto Watanna.

A Shady Deal—By Archie P. McKishnie.

The City of Lost Laughter—By Mary Josephine Benson.

The Voice of Canada Interpreted

A new department starts in this number given over to summarizing and presenting opinion in Canada on outstanding topics, as reflected in the press. In this issue the department is given over to a careful compilation of opinion on the problems of the returned soldier.

Events of the World in the Remaking

Germany Ready for Trade War
Three-Year Marriages in France
No Solution in Ireland Possible?
Controlling Booze in Britain
Is Czar Still Alive?

Did Dr. Diesel Die?
The Secret British Ferry
The Poison That Didn't
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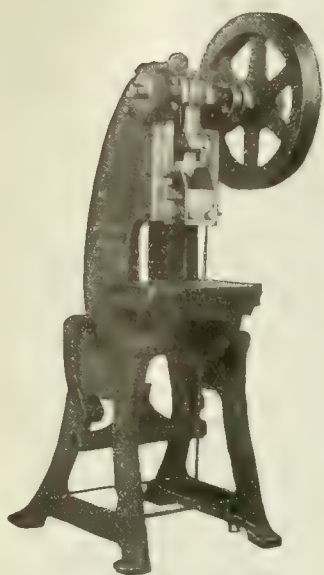
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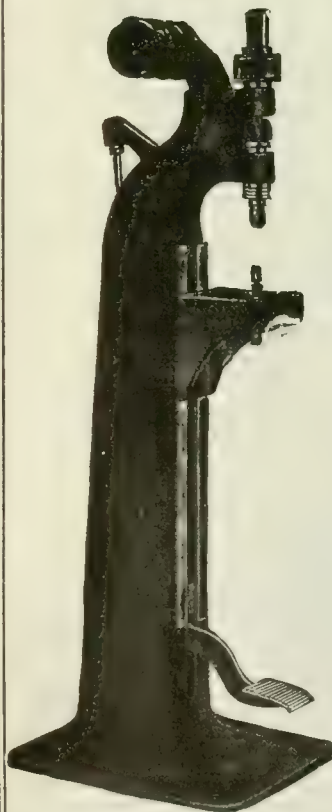
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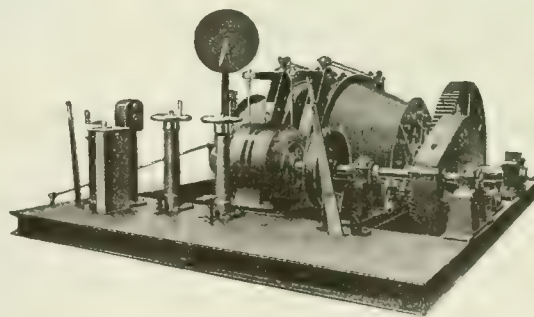


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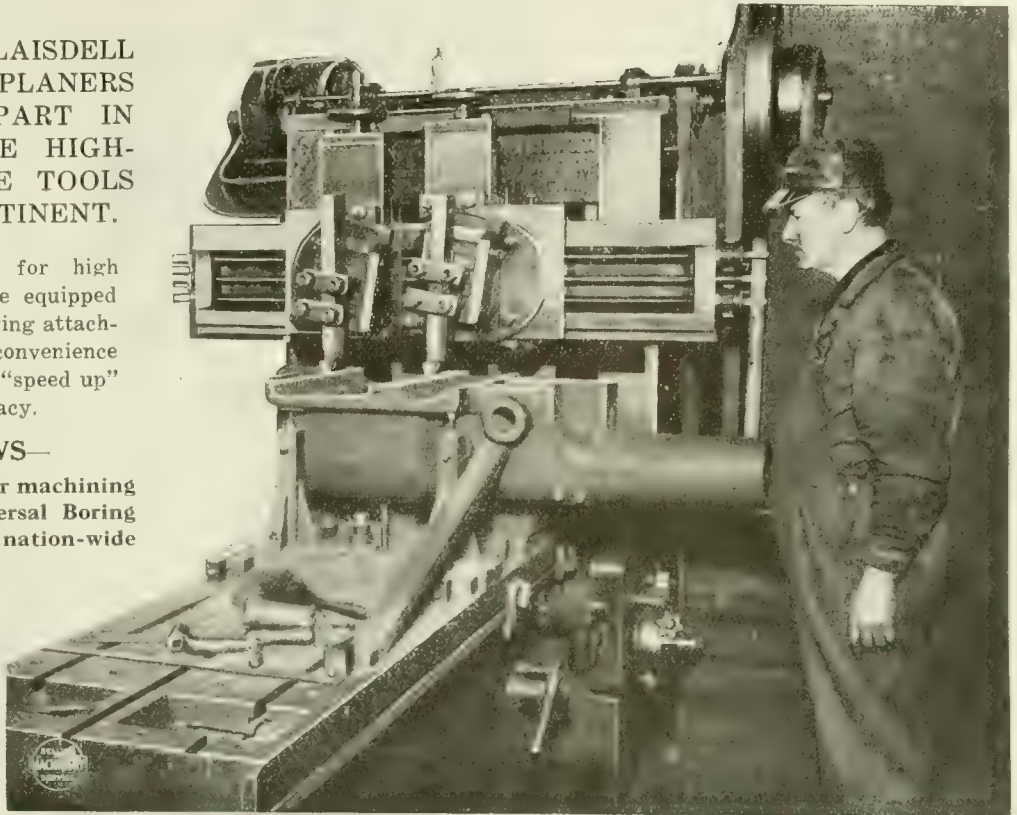
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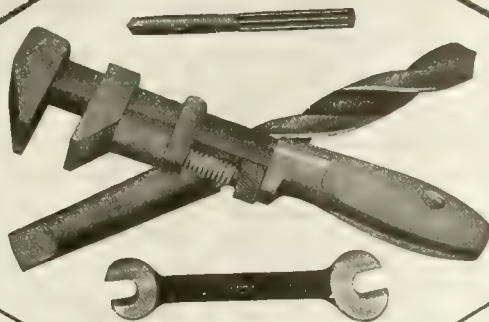
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SHOP FURNITURE
 Dennis Wire & Iron Works, London, Ontario.
 New Britain Mach. Co., New Britain, Conn.

SIDE TOOLS
 Armstrong Bros. Tool Co., Chicago.
 Can. B. K. Morton, Toronto, Montreal.
 Williams & Co., J. H., Brooklyn, N.Y.

SILENT CHAINS
 Can. Link-Belt Co., Toronto, Ont.
 Jones & Glasco, Montreal.

SLEDGES
 Aikenhead Hardware Co., Toronto, Ont.
 Rice, Lewis & Son, Toronto, Ont.
 Whitman & Barnes Mfg. Co., St. Catharines, Ont.
 Wilkinson & Rompage, Hamilton, Ont.

SLEDGES, CAST IRON
 Katie Foundry, Galt, Ont.

SLINGS, CHAIN
 Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

SLOTTERS
 Betts Machine Co., Rochester, N.Y.
 Garvin Machine Co., New York.
 National-Acme Co., Cleveland, Ohio.
 Niles-Bement-Pond Co., New York.
 Rhodes Mfg. Co., Hartford, Conn.

SMOKESTACKS
 Canadian Welding Works, Montreal, Que.
 MacKinnon Steel Co., Sherbrooke, Quebec.
 Marsh Engineering Works, Belleville, Ont.

SNIPS, TINNERS AND SHEET METAL WORKERS'
 Kourner & Trecker Co., Milwaukee, Wis.

SOCKETS
 Brown & Sharpe Mfg. Co., Providence.
 Cleveland Twist Drill Co., Cleveland.
 Keystone Mfg. Co., Buffalo, N.Y.
 Modern Tool Co., Erie, Pa.
 Torco Twist Drill & Mch. Co., New Bedford, Mass.
 Rice Lewis & Son, Toronto, Ont.

SOCKET HEAD CAP SCREWS
 Allen Mfg. Co., Hartford, Conn.

SOIL PIPE FITTINGS, CAST IRON
 Katie Foundry, Galt, Ont.

SOLDERING IRONS
 Aikenhead Hardware Co., Toronto, Ont.
 Brown, Boggs & Co., Hamilton, Canada.
 Prest-O-Lite Co., Inc., Toronto, Ont.
 Rice, Lewis & Son, Toronto, Ont.
 United Brass & Lead Ltd., Toronto.

SOLDER
 Aikenhead Hardware Co., Toronto, Ont.
 Rice, Lewis & Son, Toronto, Ont.
 Tallman Brass & Metal Co., Hamilton.
 United Brass & Lead, Ltd., Toronto.

SPEED REDUCING GEARS
 Can. Link-Belt Co., Toronto, Ont.
 Jones & Glasco, Montreal.

SPIKES
 Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

SPLICING CLAMPS
 Peck, Stow & Wilcox Co., Southington, Conn.

SPRINGS, MACHINERY
 Barnes Wallace Co., Bristol, Conn.
 Can. Steel Foundries, Ltd., Montreal, Que.
 Cleveland Wire Spring Co., Cleveland.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Jas. Steele, Ltd., Quebec, Ont.

SPECIAL MACHINERY
 Baird Machine Co., Bridgeport, Conn.
 Panfield, W. H., & Sons, Toronto.

Beaver Engineering Co., Montreal, Que.
 Bertram, John, & Sons Co., Dundas.
 Bliss, E. W. Co., Brooklyn, N.Y.
 Brown, Boggs & Co., Hamilton, Canada.
 Brown Engineering Corp., Toronto, Ont.
 Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
 Ferracute Mach. Co., Bridgeton, N.J.
 Ford-Smith Machine Co., Hamilton, Ont.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Garvin Machine Co., New York.
 Gooley & Edlund, Inc., Courland, N.Y.
 John H. Hall & Sons, Brantford.
 Hydraulic Machy. Co., Ltd., Montreal, Que.
 A. B. Jardine & Co., Hespeler, Ont.
 Katie Foundry, Galt, Ont.
 National-Acme Co., Cleveland, Ohio.
 Mulliner & Enlund Tool Co., Syracuse, N.Y.
 Marten Machine Co., Hamilton, Ont.
 Reed-Prentice Co., Worcester, Mass.
 Sleeper & Hartley, Inc., Worcester, Mass.
 Stoll Co., D. H., Buffalo, N.Y.
 Victoria Foundry Co., Ottawa, Ont.
 Welland Motor & Machine Co., Welland, Ont.
 Wilson & Co., J. C., Belleville, Ont.
 William R. Farria Ltd., Toronto.
 Windsor Mach. & Tool Co., Windsor, Ont.

SPRING COILING AND WINDING MACHINERY
 Baird Machine Co., Bridgeport, Conn.
 Garvin Machine Co., New York.
 Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
 Baird Machine Co., Bridgeport, Conn.
 Sleeper & Hartley, Inc., Worcester, Mass.

SPROCKETS, CHAIN
 Can. Link-Belt Co., Toronto, Ont.
 Grant Gear Works, Boston, Mass.
 Jones & Glasco, Montreal.
 Morse Chain Co., Ithaca, N.Y.
 Philadelphia Gear Works, Philadelphia, Pa.
 Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CAST
 Can. Link-Belt Co., Toronto, Ont.
 Perrin, Wm. E., Toronto, Ont.
 Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CHILLED THREAD
 Katie Foundry, Galt, Ont.

SQUARES
 Peck, Stow & Wilcox Co., Southington, Conn.

STAYBOLT TOPS
 Greenfield Tap & Die Corp., Greenfield, Mass.
 Wells Bros. of Can., Galt, Ont.

STAIRS, IRON
 Can. Welding Works, Montreal, Que.
 Canada Wire & Iron Goods Co., Hamilton, Ont.

STAMPINGS, SHEET BRASS, COPPER, ALUMINUM AND STEEL
 Dom. Forge & Stamping Co., Walkerville, Ont.
 Homer & Wilson, Hamilton, Ont.
 Wentworth Mfg. Co., Hamilton, Ont.

STAMPINGS, METAL
 American Pulley Co., Philadelphia, Pa.

STAMPING MACHINERY
 Bliss Co., E. W., Brooklyn, N.Y.
 Brown, Boggs & Co., Hamilton, Canada.
 Canada Machinery Corp., Galt, Ont.
 Ferracute Mach. Co., Bridgeton, N.J.

STAMPS, STEEL, ALPHABET FIGURES
 Matthews, Jas. H. & Co., Hartford, Conn.
 Pritchard-Andrews Co., Ottawa, Can.

STAPLE MACHINES
 Sleeper & Hartley, Inc., Worcester, Mass.

STEAM APPLIANCES
 Darling Bros., Ltd., Montreal, Quebec.

STEAM SEPARATORS AND TRAPS
 Can. Fairbanks-Morse Co., Montreal.
 Sheldons, Ltd., Galt, Ont.

STEEL BALLS
 Rochester Ball Bearing Co., Rochester, N.Y.

STEEL, CRUCIBLE TOOL
 Hammond Steel Co., Inc., Syracuse, N.Y.
 Illingworth Steel Co., John, New York, N.Y.
 Vulcan Crucible Steel Co., Alliquippa, Pa.

STEEL, CARBON, FERRO-TUNGSTEN
 Armstrong, Whitworth of Canada, Montreal, Que.
 Baker & Co. Inc., H. Montreal, Que.
 Can. B. K. Morton, Toronto, Montreal.
 Pirb & Sons, Thos., Montreal, Que.
 Latrobe Electric Steel Co., Latrobe, Pa.
 Vanadium-Alloys Steel Co., Pittsburgh, Pa.
 Vulcan Crucible Steel Co., Alliquippa, Pa.

STEEL CASTINGS
 Joliet Steel Co., Montreal, Que.
 Kennedy & Sons, Wm. Owen Sound, Ont.
 Can. Brakeshoe Co., Sherbrooke, Que.
 Nova Scotia Steel & Coal Co., New Glasgow, N.S.
 Swedish Crucible Steel Co., Windsor, Ont.

STEEL, COLD ROLLED
 Can. Drawn Steel Co., Hamilton, Ont.
 Rice Lewis & Son, Toronto, Ont.
 Swedish Steel & Importing Co., Ltd., Montreal.
 Union Drawn Steel Co., Hamilton, Ont.

STEEL, PRESSURE BLOWERS
 Can. Blower & Forge Co., Kitchener, Ont.
 Can. Fairbanks-Morse Co., Montreal.
 Sheldons, Ltd., Galt, Ont.

STEEL, NICKEL
 Pirb & Sons, Thos., Montreal, Que.
 Vulcan Crucible Steel Co., Alliquippa, Pa.

STEEL, HIGH SPEED
 Armstrong, Whitworth of Canada, Ltd., Montreal.
 Atkins & Co., Wm., Sheffield, Eng.
 Baker & Co. Inc., H. Montreal, Que.
 Can. Fairbanks-Morse Co., Montreal.
 Can. B. K. Morton, Toronto, Montreal.
 H. A. Drury Co., Ltd., Montreal.
 Marshall & Co., Geo., Toronto, Ont.
 Pirb & Sons, Thos., Montreal, Que.
 Hawkridge Bros. Co., Boston, Mass.
 Illingworth Steel Co., John, New York, N.Y.
 Latrobe Electric Steel Co., Latrobe, Pa.
 Plawes, Ltd., Winnipeg, Man.
 Rice Lewis & Son, Toronto, Ont.
 Standard Alloys Company, Pittsburgh, Pa.
 Swedish Steel & Importing Co., Ltd., Montreal.

Vanadium-Alloys Steel Co., Pittsburgh, Pa.
 Vulcan Crucible Steel Co., Alliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.

STEEL, GRIT
 Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, CHROME AND MANGANESE
 Joliet Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
 Illingworth Steel Co., John, New York, N.Y.

STEEL, CRUSHED
 Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

STEEL, ROCK DRILL
 Armstrong, Whitworth of Canada, Montreal, Que.

STEEL, SPECIAL ELECTRIC ALLOY
 Hammond Steel Co., Inc., Syracuse, N.Y.

STELLITE, HIGH-SPEED TOOL METAL
 Deloro Smelting & Refining Co., Toronto, Ont.

STEEL, STRUCTURAL
 Algoma Steel Corp., Sault Ste. Marie, Ont.

STEEL, VANADIUM
 Armstrong, Whitworth of Canada, Montreal, Que.
 Drury, H. A., Co., Montreal, Que.
 Standard Alloys Co., Pittsburgh, Pa.
 Vanadium-Alloys Steel Co., Alliquippa, Pa.

STOCK RACKS FOR BARS, PIPING, ETC.
 Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
 New Britain Machine Co., New Britain, Conn.

STOCKS AND DIES
 Greenfield Tap & Die Corp., Greenfield, Mass.
 Wells Bros. of Can., Galt, Ont.

STOCKS, PIPE
 Butterfield & Co., Rock Island, Que.
 A. B. Jardine & Co., Limited, Hespeler, Ont.
 Rice, Lewis & Son, Toronto, Ont.
 Wells Bros. Co. of Canada, Galt, Ont.

STOOLS, STEEL, SHOP
 New Britain Machine Co., New Britain, Conn.

STRAIGHTENING MACHINERY
 Baird Machinery Co., Bridgeport, Conn.
 Bertrams, Ltd., Edinburgh, Scotland.

STRAND
 Page Steel & Wire Co., Adrian, Mich.

SUPPLIES, CONTRACTORS'
 Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

STRUCTURES, STEEL BUILDINGS
 Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

SYSTEMS, REMOTE CONTROL FOR OIL AND GASOLINE
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

STORAGE AND HANDLING SYSTEMS FOR DRY CLEANERS, AND NAPHTHA
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, RECLAIMING, FOR OIL
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, RAILWAY OIL, STORAGE AND HANDLING
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, PAINT, OIL STORAGE AND HANDLING
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SYSTEMS, OIL STORAGE AND DISTRIBUTING
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

SWITCHES, RAILWAY
 Can. Steel Foundries, Ltd., Montreal.

TABLES, SAND-BLAST
 Pangborn Corporation, Hagerstown, Md.

TACK (DOUBLE POINT) MACHINES
 Sleeper & Hartley, Inc., Worcester, Mass.

TAPPING MACHINES (PNEUMATIC)
 Cleveland Pneumatic Tool Co. of Can., Toronto.

TANKS, GASOLINE, KEROSENE AND OIL
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.
 Dominion Bridge Co., Montreal, Quebec.
 MacKinnon Steel Co., Sherbrooke, Que.
 St. Lawrence Welding Co., Montreal, Que.

TANKS, LUBRICATING OIL STORAGE
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANKS, RUBBER CEMENT
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANKS, STEEL, WATER PRESSURE
 Bowser & Co., Inc., S. F., Toronto, Ont.
 Can. Welding Works, Montreal, Que.
 Dominion Bridge Co., Montreal, Quebec.
 MacGovern & Co., Montreal, Que.
 MacKinnon Steel Co., Sherbrooke, Que.
 St. Lawrence Welding Co., Montreal, Que.
 Toronto Iron Works, Ltd., Toronto.

TANKS, UNDERGROUND STORAGE
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TANK WAGONS
 Canadian Welding Works, Montreal, Que.
 MacKinnon Steel Co., Sherbrooke, Que.
 St. Lawrence Welding Co., Montreal, Que.
 Toronto Iron Works, Ltd., Toronto.

TANKS, WHEEL, FOR LUBRICATING OIL AND GASOLINE
 Bowser & Co., S. F., Inc., Fort Wayne, Ind.

TAPES, MEASURING
 James Chesterman & Co., Ltd., Sheffield, Eng.
 Rice Lewis & Son, Toronto, Ont.

TAPPING MACHINES AND ATTACHMENTS
 Bertram, John, & Sons Co., Dundas.
 Canada Machinery Corp., Galt, Ont.
 Garvin Machine Co., New York.
 The Geometric Tool Co., New Haven.
 J. H. Hall & Sons, Brantford, Ont.
 A. B. Jardine & Co., Hespeler, Ont.
 Landis Machine Co., Waynesboro, Pa.
 Modern Tool Co., Erie, Pa.
 Murchey Machine & Tool Co., Detroit.
 Niles-Bement-Pond Co., New York.
 Rickert-Shafer Co., Erie, Pa.
 National-Acme Co., Cleveland, Ohio.
 L. S. Starrett Co., Athol, Mass.
 Whitney Mfg. Co., Hartford, Conn.
 Williams & Wilson, Limited, Montreal, Que.

TAPES—MEASURING, STEEL AND WOVEN
Lufkin Rule Co. of Can., Windsor, Ont.

TAPES, POCKET
Lufkin Rule Co. of Can., Windsor, Ont.

TAPES, ADJUSTABLE
Baxter Co., Ltd., J. R., Montreal, Que.
Baker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Victor Tool Co., Waynesboro, Pa.

TAPS, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, GUN
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE RELIEVED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE SCREW
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, PIPE
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, STAYBOLT, "MAX" TAP
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, TAPPER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, DIES AND WRENCHES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mch. & Supply Co., Montreal.
Geometric Tool Co., New Haven.
Greenfield Tap & Die Corp., Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

TAP EXTENSIONS
Allen Mfg. Co., Hartford, Conn.

TAP EXTRACTORS
Walton Co., The, Hartford, Conn.

THERMOMETERS, INDUSTRIAL
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, ENGRAVED
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, TEMPERATURE AND PRESSURE
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, RECORDING AND INDEX
Bristol Co., Waterbury, Conn., U.S.A.
Taylor Instrument Co., Rochester, N.Y.

TESTING INSTRUMENTS
METALLURGICAL
Shore Instrument & Mfg. Co., New York City

TESTING LABORATORIES
Toronto Testing Laboratory, Toronto.

THREAD-CUTTING MACHINES
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Garlock-Walker Mach. Co., Ltd., Toronto, Ont.
Geometric Tool Co., New Haven.
A. B. Jardine & Co., Limited, Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Mach. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

THREADING TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

THREADING MACHINES FOR BOLTS, NUTS AND PIPES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

THREAD MILLING MACHINES
Taft-Pierce Mfg. Co., New York, N.Y.
Smalley-General Co., Inc., Bay City, Mich.

THUMB SCREWS AND NUTS
Canada Foundry & Forgings, Ltd., Welland, Ont.
United Brass & Lead Ltd., Toronto.
Williams & Co., J. H., Brooklyn, N.Y.

TINSMITHS' TOOLS
Brown, Boggs & Co., Hamilton, Can.
Williams & Wilson, Limited, Montreal, Que.

TIRE BENDERS
A. B. Jardine & Co., Limited, Hespeler, Ont.
TIRE SETTING MACHINES, HYDRAULIC
William R. Perrin, Ltd., Toronto.
West Tire Setter Co., Rochester, N.Y.

TOOL CASES
Rice, Lewis & Son, Toronto, Ont.

TOOL HOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.

Armstrong Bros. Tool Co., Chicago.
Deloro Smelting & Refining Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL POSTS, LATHE
Armstrong Bros. Tool Co., Chicago.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL ROOM PARTITIONS
Canada Wire & Iron Goods Co., Hamilton.

TOOL STEEL
Armstrong, Whitworth, Ltd. of Canada, Montreal.
Atkins & Co., Wm., Sheffield, Eng.
Baker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Deloro Smelting & Refining Co., Toronto, Ont.
General Steel Co., Milwaukee, Wis.
H. A. Drury Co., Montreal.
Firth & Sons, Thos., Montreal, Que.
Hammond Steel Co., Inc., Syracuse, N.Y.
Harvey & Co., Arthur C., Boston, Mass.
Hawbridge Bros. Co., Boston, Mass.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall & Co., Geo., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Vanadium-Alloy Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

TOOLS, BENDING
Peck, Stow & Wilcox Co., Southington, Conn.

TOOLS, BLACKSMITHS'
A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.

TOOLS, ADJUSTABLE BORING
The Kelly Reamer Co., Cleveland, O.
Williams & Wilson, Limited, Montreal, Que.

TOOLS, ELECTRIC
Independent Pneumatic Tool Co., Chicago, Ill.
A. R. Williams Machinery Co., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
United States Elec. Tool Co., Cincinnati, O.

TOOLS, FORMING
Davidson Tool Mfg. Co., New York, N.Y.

TOOLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

TOOLS, LATHE, PLANNER, SLOTTER
Armstrong Bros. Tool Co., Chicago.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y.

TOOLS, SCREW MACHINE
Foster Machine Tool Co., Ekhardt, Ind.

TORCHES, STEEL
Armstrong, Whitworth of Canada, Ltd., Montreal.
Prest-O-Lite Co., Inc., Toronto, Ont.

TRACK, PORTABLE STEEL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

TRACK SYSTEMS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

TRANSFORMERS
MacGovern & Co., Montreal, Que.

TRANSMISSION MACHINERY
American Pulley Co., Philadelphia, Pa.
A. R. Williams Machinery Co., Toronto.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto.
Jones & Glasco, Montreal.
Kennedy & Sons, Wm., Owen Sound, Ont.
Morse Chain Co., Ithaca, N.Y.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Limited, Montreal, Que.

TRANSMISSION POLES
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

TRANSMISSION ROPE
Jones & Glasco, Montreal, Que.
MacKinnon Steel Co., Ltd., Sherbrooke, Que.
Wilson & Co., J. C., Belleville, Ont.

TRANSMISSION TOWERS
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Dominion Bridge Co., Montreal, Quebec.
MacKinnon Steel Co., Sherbrooke, Quebec.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
Northern Crane Works, Walkerville.
Tallman Press & Metal Co., Hamilton.

TRANSEVEYORS
Cowan Truck Co., Holyoke, Mass.

TROLLEYS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

TRUCKS, FACTORY, FREIGHT, ETC.
Canada Machinery Corp., Galt, Ont.
Chapman Double Belt Bearing Co., Toronto.
Cowan Truck Co., Holyoke, Mass.
MacKinnon Steel Co., Sherbrooke, Quebec.
Rice, Lewis & Son, Toronto, Ont.

TRUCKS, LUMBER AND KILN
Sheldons, Ltd., Galt, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Northern Crane Works, Walkerville.

TUBING, SEAMLESS, BRASS & COPPER
Standard Tube & Fitting Co., Wadstock, Ont.
Tallman Brass and Metal Co., Hamilton, Ont.

TURING COILERS, FLEXIBLE METAL
Almond Mfg. Co., T. R., Ashburnham, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.

TURRET MACHINES, LATHES
Brown & Sharpe Mfg. Co., Providence

Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Tap & Die Corp., Greenfield, Mass.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney, Hartford, Conn.
Wall, Bros. of Can., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

TUNGSTEN FILAMENT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

TURBINES, HORIZONTAL
Wilson & Co., J. C., Belleville, Ont.

TURBO GENERATOR UNITS
MacGovern & Co., Montreal, Que.
Warner & Swasey, Cleveland, O.
Garrin Machine Co., New York.

TURNBUCKLES
Canada Foundries & Forgings, Ltd., Welland, Ont.
Rice, Lewis & Son, Toronto, Ont.

TURNABLES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

UPSETTING AND BENDING MACHINERY
John Bartram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.
National Mach. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Williams & Wilson, Limited, Montreal, Que.

VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto

VALVES, HYDRAULIC
Metalwood Mfg. Co., Detroit, Mich.

VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y.

VENTILATING APPARATUS
Brantford Oven & Rack Co., Brantford, Ont.
Can. Blower & Forge Co., Kitchener, Ont.

WELDS, PORTABLE
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Limited, Montreal, Que.

WELDS, PORTABLE
New Britain Machine Co., New Britain, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

WELDS, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Becker Milling Machine Co., Boston, Mass.
The Geo. F. Foss Mch. & Supply Co., Montreal.
New Britain Machine Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

WELDS, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Wells Bros. Co. of Canada, Galt, Ont.
J. H. Williams & Co., Brooklyn, N.Y.
Williams & Wilson, Limited, Montreal, Que.

WELDS, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Williams & Wilson, Limited, Montreal, Que.

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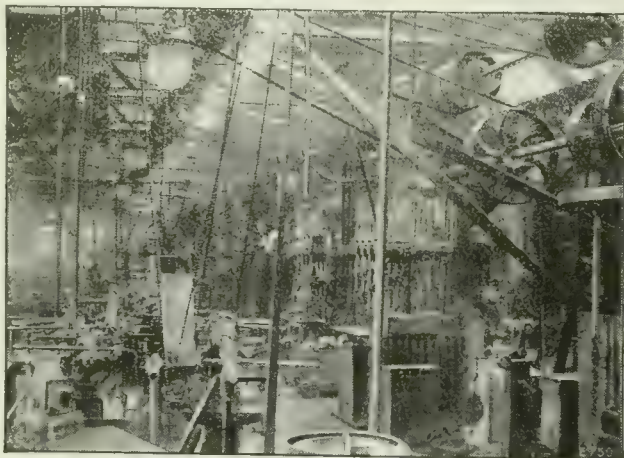
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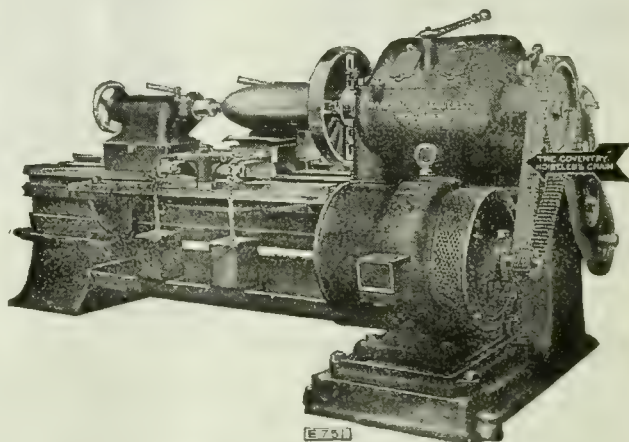


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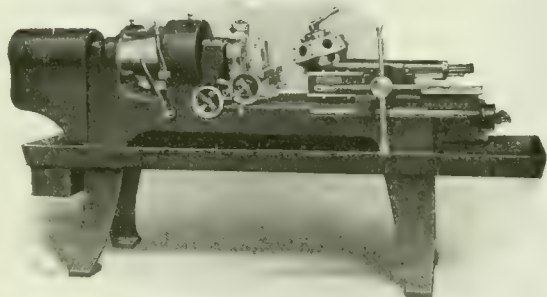


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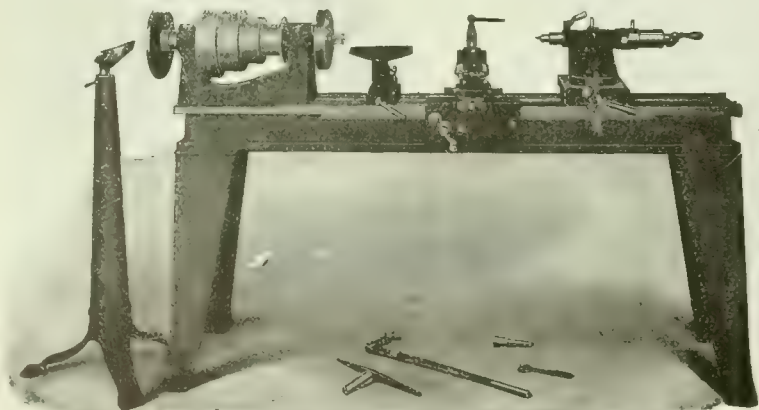


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AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XXI.

TORONTO, MARCH 12, 1919

No. 11

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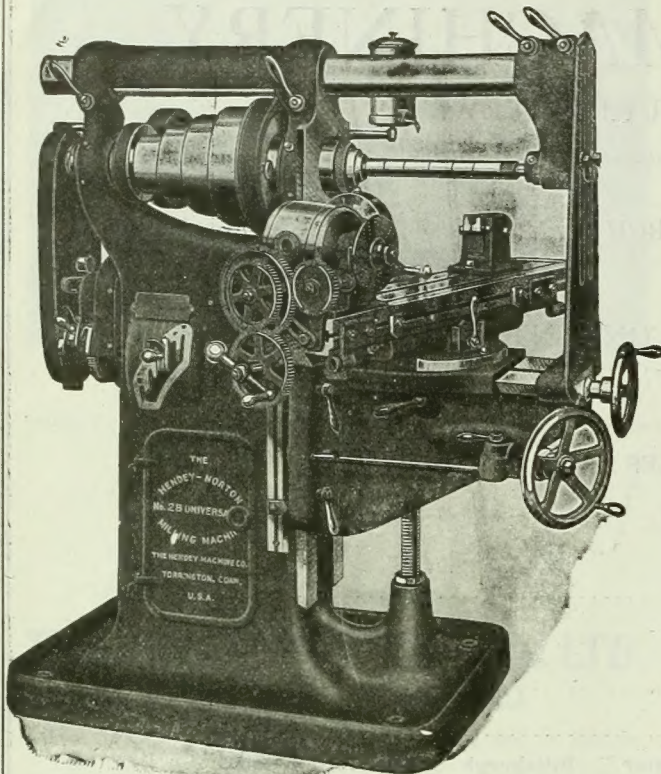
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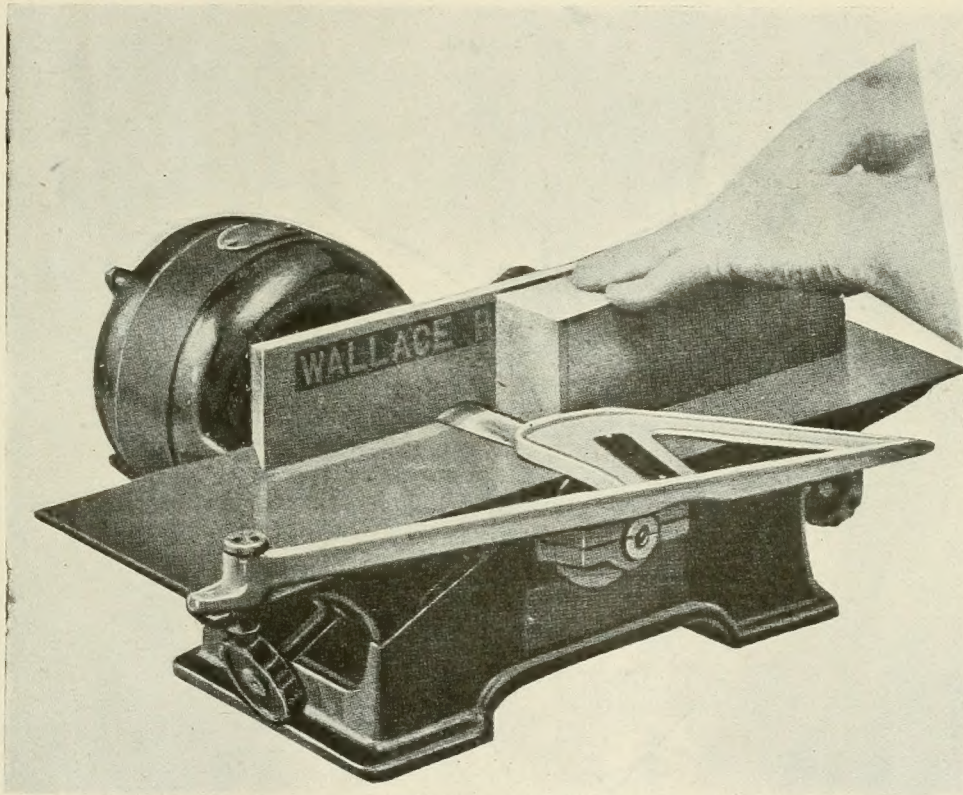
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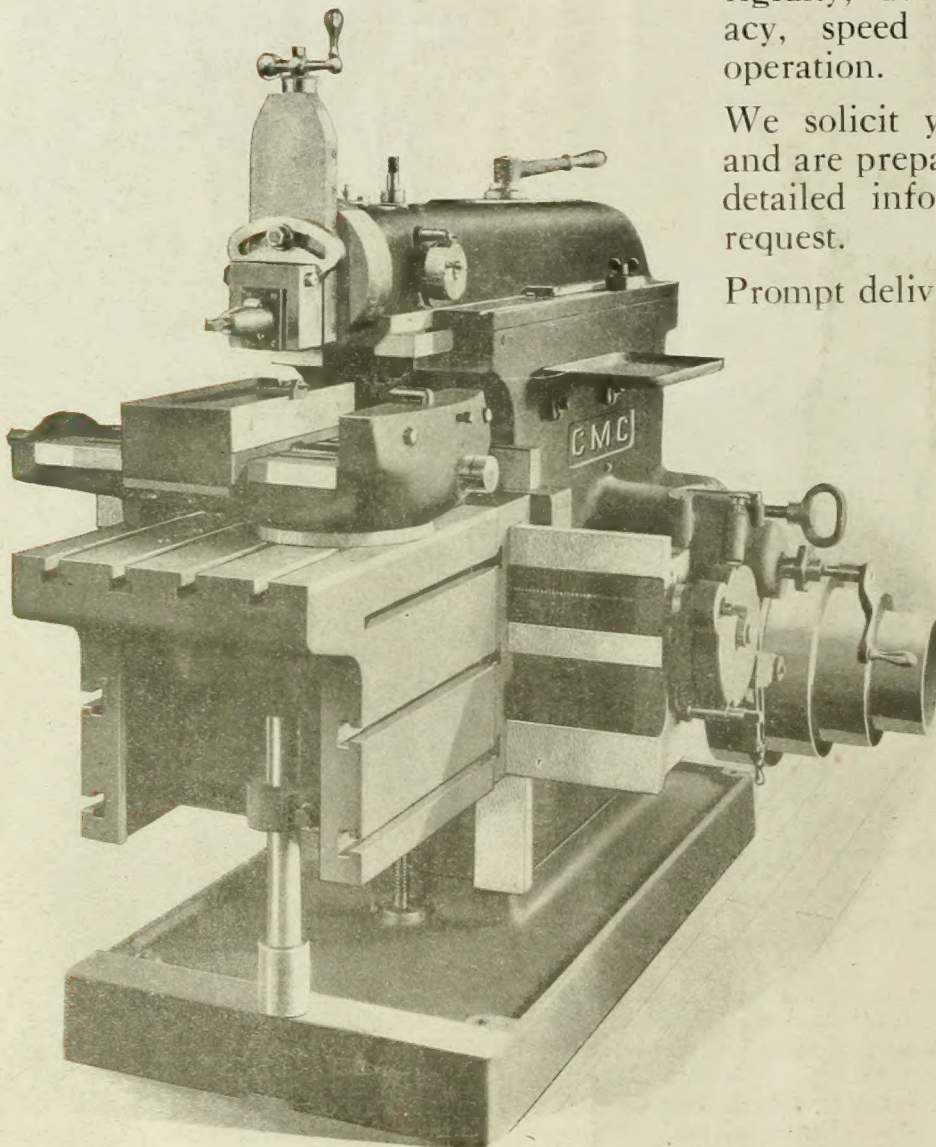
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